X-Control

User Manual

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XenICs, October 2005.

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1. Introduction

X-Control software and its graphical user interface are designed so that it can be mastered quickly and easily by the users yet provide the power and flexibility that the engineering staff demands. We believe the challenge providing such an interface has been met through the development of the X-Control software.

System requirements

To be able to run X-Control with the camera of Xenics, the user needs at least:

- Windows 2000 Professional (SP4) or Windows XP
- 512 MB RAM
- USB2 port
- CDROM/DVD ROM for installation
- Display resolution of at least 1024x768

Note: it is possible to run the X-Control software without having a camera in demo mode, see further.

System hardware components

The hardware configuration consists of:

- A Xenics camera, complete with power supply
- Optional interfaces[1]
  - USB cable
  - A trigger or 'arm' cable
  - A PCI interface card
  - A cable to connect a camera to a PCI interface card
  - An NTSC or PAL interface

[1] Depends of the camera model

USB FPA CAMERA
The hardware configuration consists of:

- A XEVA-USB-FPA camera, complete with power supply
- A USB cable
- A trigger or 'arm' cable (optional)
- An NTSC or PAL interface[2]

XMID FPA
The hardware configuration consists of:

- A XEVA-USB-XMID camera, complete with power supply
- A USB cable
- A trigger or 'arm' cable (optional)
- An NTSC or PAL interface

WATERCOOLED CAMERA
The hardware configuration consists of:

- Water cooled camera, complete with power supply
- A USB cable
- A trigger or 'arm' cable (optional)
- An NTSC or PAL interface

CAMERA LINK FPA
The hardware configuration consists of:

- A XEVA-CL-FPA camera, complete with power supply
- A Camera Link (PCI-CL) "frame-grabber" card
- A Camera Link cable connecting camera to frame-grabber
- A mini-USB-B cable for maintenance and programming purposes
- A fast PC
- A trigger or 'arm' cable (optional)

The Camera Link interface consists of a high-speed data channel carrying data from the camera to the PC.

A supplementary, bi-directional serial channel (USB) is used to carry command and status information between the host computer and a camera. This serial channel will be used for uploading of the camera's logic, changing settings and/or command scripts.

LVDS CAMERA
The hardware configuration consists of:

- A XEVA-LVDS-FPA camera, complete with power supply
- A LVDS (PCI-CL) "frame-grabber" card
- A LVDS cable connecting camera to frame-grabber
- A USB cable for maintenance and programming purposes
- A fast PC
- A trigger or 'arm' cable (optional)

[2] Depends of the camera model

The LVDS interface consists of a high-speed data channel carrying data from the camera to the PC.

A supplementary, bi-directional serial channel (USB) is used to carry command and status information between the host computer and a camera. This serial channel will be used for uploading of the camera's logic, changing settings and/or command scripts.

XS CAMERA
The hardware configuration consists of:

- A XEVA-XS-FPA camera, complete with power supply
- A USB cable for maintenance and programming purposes (optional)
- An NTSC or PAL interface

XPORT
The hardware configuration consists of:

- An XPORT camera, complete with power supply
- A USB cable
- A trigger or 'arm' cable (optional)

Applications
The XEVA or other infra-red camera is a state-of-the-art IR camera system, designed for the following applications:

- Near-infrared imaging
- Hyper spectral imaging
- Spectral characterization
- Thermal imaging of hot objects (between 200 and 800 °C)
- On-line process control
- Web processing
- Non-destructive inspection
- Food inspection
- Agricultural monitoring
- Moisture measurement
- Biomedical & Chemical applications
- Pollution and environment monitoring
- Semiconductor process monitoring
- …

There are several other applications where this super sensitive digital IR FPA camera can be used. The XEVA-USB-FPA camera comes with C++, Labview 6.1 software and drivers. The user manual is intended as a guide to set up your system and to get the first results.

General Xeva camera specifications

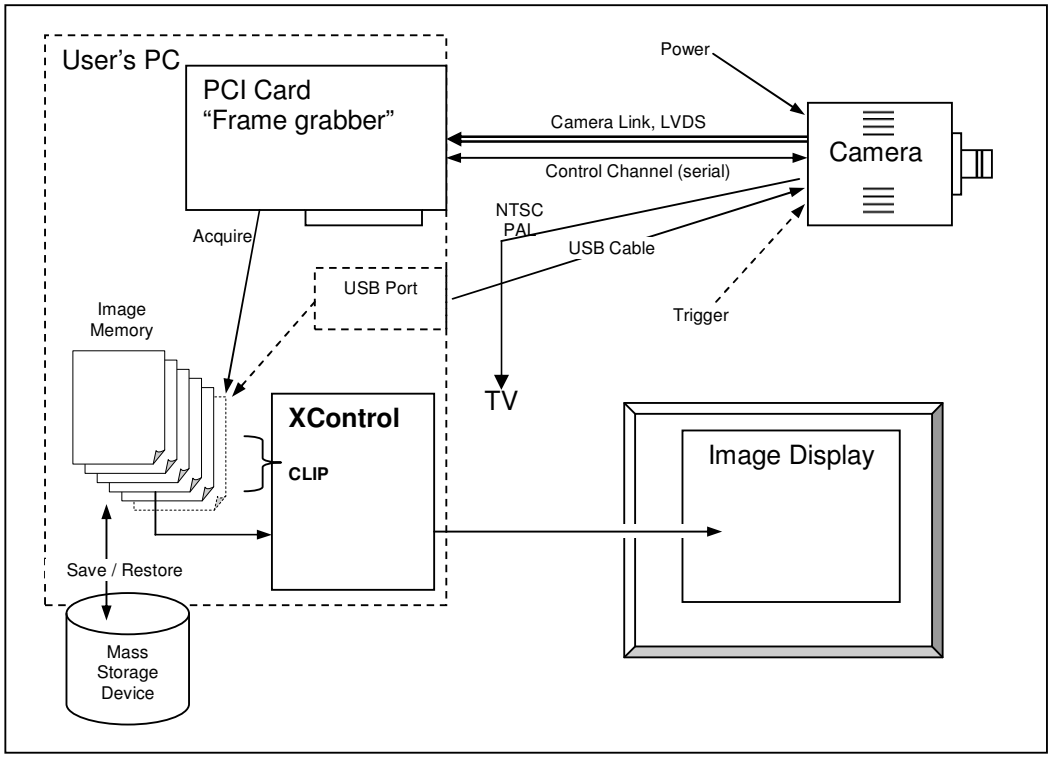
The XenICs Xeva USB camera combines a thermo-electrically cooled detector head and the control and communication electronics. The exceptional efficiency of the installed detector in the infrared makes it possible to perform analysis on light emitted in wavelengths not visible to the naked eye.

The camera head is designed within aluminum anodized housing. In front you will find a lens fitting. Any standard C-mount lens, which is able to process the infrared light, can be mounted on the housing. Your camera is supplied with a standard C-mount lens. Also compatible are CS-mount lenses if an additional adapter is used. At the rear end, one can find the fan inlet.

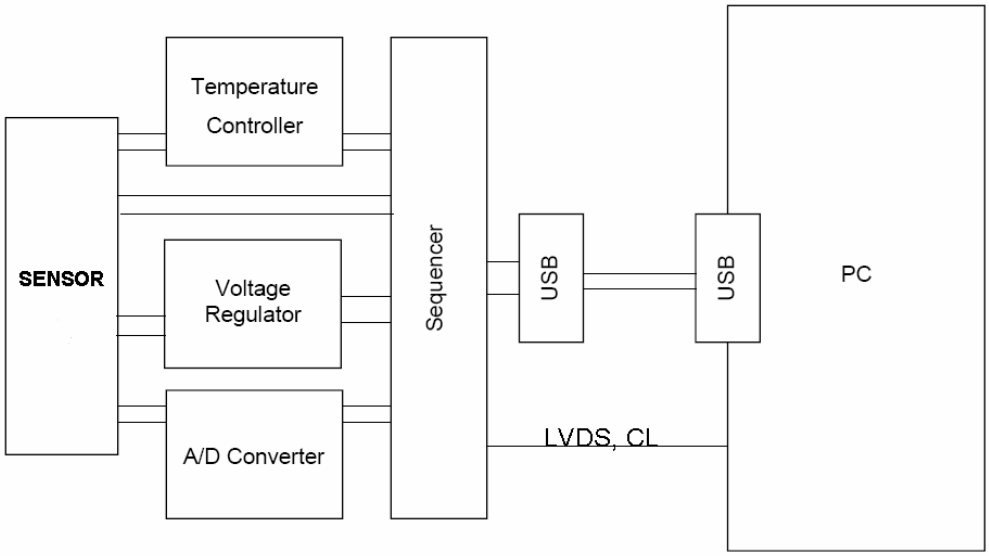
The fan is used to cool the thermo-electric cooler. All the electrical connectors are to be found at the rear end.

The XEVA-USB FPA digital camera is operated from one single 12 V – 5 A power supply (included in the configuration) and includes all voltage regulating circuits, a temperature stabilization circuit for the cooling of the detector and the signal output analog to digital conversion. The camera head interfaces to a PC via a standard USB 1.1 or 2.0 bus; there is no need for additional frame grabber cards. Frame grabbing via LVDS or Camera Link is available for the XEVA-LVDS-FPA and the XEVA-CL-FPA. An additional PCI frame-grabber card is needed for those cameras.

Interfaces



General camera layout



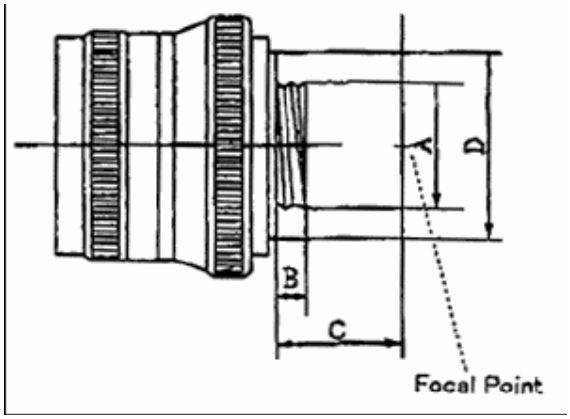
The IR sensor is connected with three interfaces:

- A temperature controller to regulate the thermo-electric cooler. This is needed to stabilize the detector working temperature.
- A voltage regulator is needed to control the sensor circuits
- An Analogue to Digital Converter is used to translate the pixel information into useful information.

Inside the camera a Sequencer will control the data flow towards and from the sensor in the right order and at the correct time.

All information is transferred digitally over a USB cable to the host PC. In case of a XEVA-LVDS-FPA and the XEVA-CL-FPA, the LVDS cable or Camera Link cable transfers all images directly to the concerned PCI frame grabber card in the PC. In those circumstances, the USB port is only used to set the required settings on the infrared camera.

Optical interface



The Xeva camera is equipped with a C-mount lens support, specified in the Japanese Industrial Standard NO. B7127 – 1960 1

A = Basic Outside Diameter	25.40mm
B = Distance between Flange Surface and Thread end	4.06mm or less
C = Flange Focal Distance	17.526mm
D = Diameter of Flange	30.15mm or less
- No. of Threads per 25.4mm	32 threads
- Shape of Thread	Unified Thread

The C-mount flange of the camera's optical support is adjustable. Thanks to this, the user can adjust the back focal length. A special key to adjust this length is provided by XenICs.

General introduction to X-Control

This GUI is mainly intended for a quick evaluation of the camera under test where all the basic settings of the camera and the configuration parameters of the FPA can be set on the desktop.

Make sure the camera is connected to your PC. Connect your USB cable first. Connect other cables (VGA, LVDS, Camera Link …). At last, power up the camera by connecting the power supply and the camera. Always power the camera before you start the software!

2. Deliveries

Shipment

Your order has been carefully packed and thoroughly inspected by XenICs and we hope that you are pleased with the camera you have selected. Please check the contents of this delivery immediately against items marked as shipped on the packing list. Item(s) listed as a quantity of zero have been backordered and will be shipped as soon as possible.

Report any discrepancy or damage to the carrier/agent that delivered your order. Note the damage or shortage on all delivery receipts or freight bills, and sign for only the material actually received. If, upon further inspection, you notice any concealed damage or loss, you must save all boxes and packaging material and notify the delivering carrier/agent.

To return or exchange items

We made all effort to design the best products. However, in some cases a failure may not be avoided. In that case, follow the instructions below.

1. Complete all information below:

Date
Purchase date
Camera description
Serial number
Organization name
Contact name
Phone
Fax
Email address
Organization address
Representative name
Description of the problem

2. Communicate this information below by either:

- Calling XenICs of Phone +32 16 38 99 00
- Send a fax to +32 16 38 99 01
- Send an email to sales@XenICs.com

XenICs will give you a repair reference number.

3. Describe the problem accurately so we can diagnose and resolve the problem.

4. Give the XenICs representative's name you have been contacting. Include this form as your packing slip.

5. When returning the camera, please ship it in its original shipping box and secure with applicable tape.

6. Address package, attention Customer Support, including the repair reference number.

7. Return the package to

XenICs, Support Department

Ambachtenlaan 44, B-3001 Leuven, Belgium

Inventory of equipment

The following items are supplied with your camera, or are needed to complete the system:

Supplied with the camera by XenICs:

1. The XenICs camera head with a C-mount compatible lens.
2. USB cable[3]
4. Switching Mode Power Supply, input: 100-240 V~ 47-63 Hz, 1.6A, output: +12V DC, 5A max
5. User manual
6. CDROM or floppy disk with driver and application software.

Option:

7. Other interface cables to the camera (LVDS, Camera Link …)[4]

[3] Depends of the camera model
[4] Depends of the camera model

3. Setting up the system

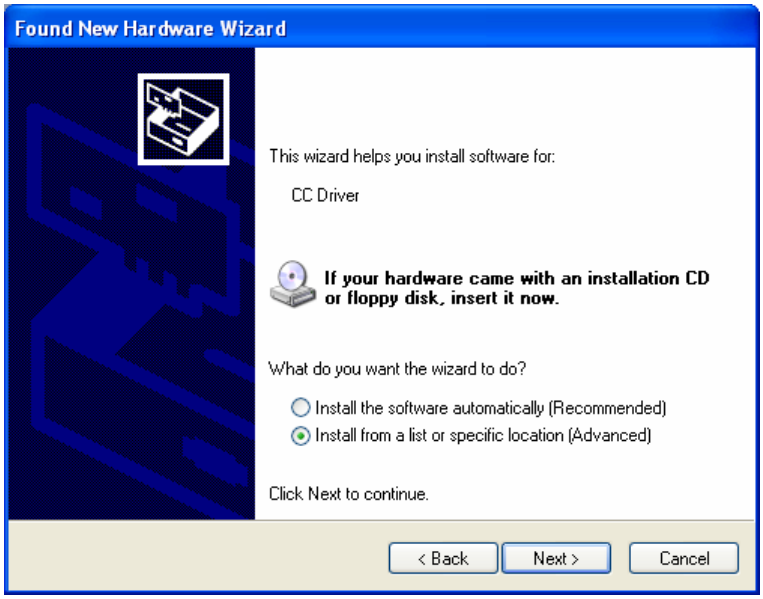
Direct use
A self-starting USB XS-camera can directly be used on TV.

Frame grabber driver installation
This installation is required if you work with a camera link or LVDS frame grabber PCI card (camera link FPA and LVDS FPA camera). The install procedure of the PCI frame grabber card is only prescribed if you are using an LVDS or Camera Link grabber card of Vector International. Consult the appropriate documentation if you are using another PCI frame grabber card.

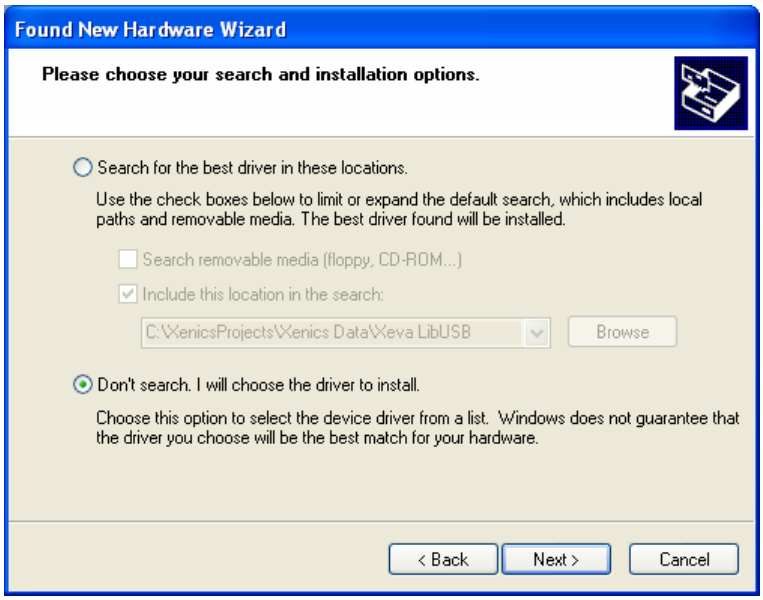
1. First shut off your PC and insert the PCI card in an empty PCI slot.
2. Do not connect the USB cable between the camera and the PC yet.
3. Do not power the camera.
4. Then restart the PC.
5. Start your computer in the Windows operating system, log on as Administrator, and insert the included CD-ROM into your computer's CD-ROM/DVD-ROM drive.
6. The found new hardware wizard will appear.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

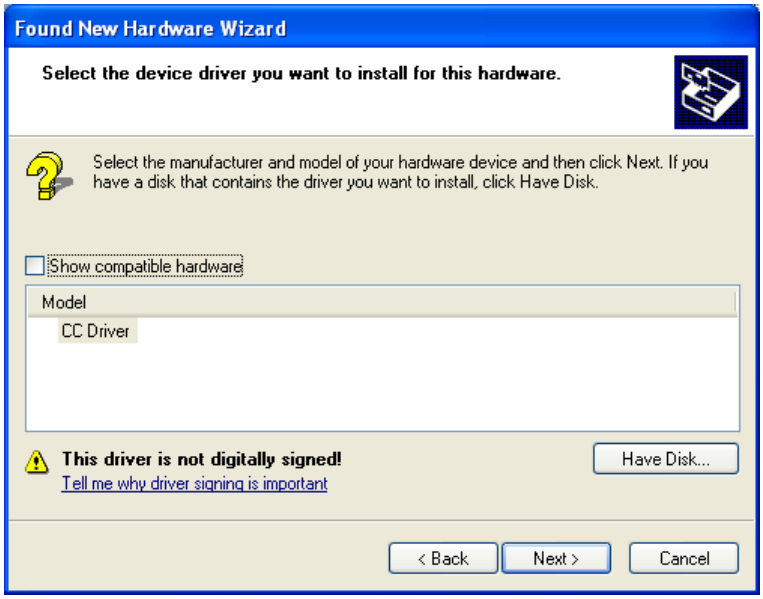
7. Select “Install from list or specific location” and click next,


Found New Hardware Wizard
This wizard helps you install software for:
CC Driver
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

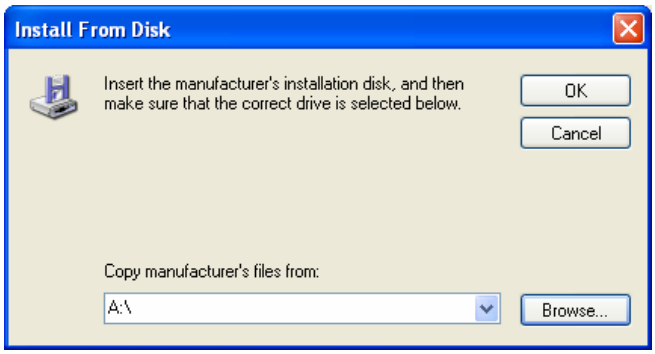
8. Do not search then click “Next >”.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:\XenicsProjects\Xenics Data\Xeva LibUSB
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

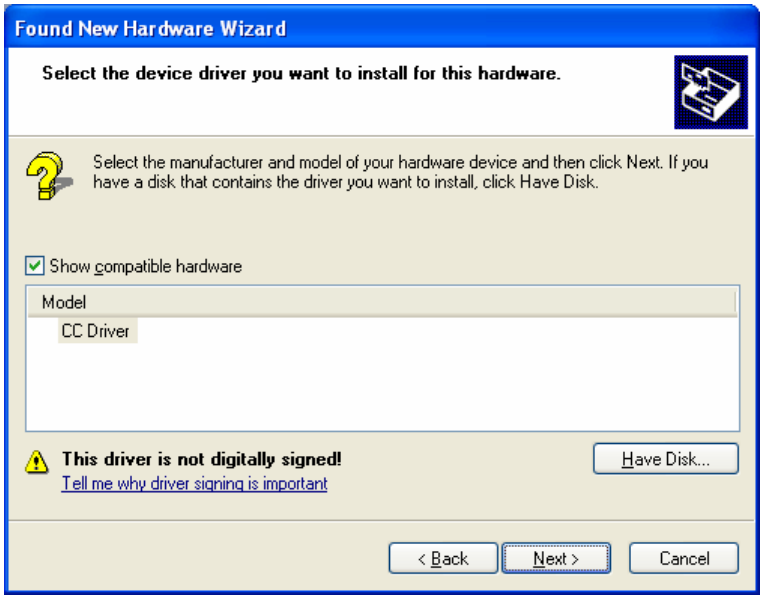
9. Click “Have Disk…”


Found New Hardware Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
CC Driver
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
< Back
Next >
Cancel

10. Select browse to the CD-ROM where the driver and the CC.INF file is located. Select “CC.INF”.



11. Click on the next button.


Found New Hardware Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
CC Driver
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
< Back
Next >
Cancel

12. Windows will now copy the files.
13. Connect the supplied Camera Link or LVDS cable from the camera to the Camera Link or LVDS port on the PCI card in your computer.

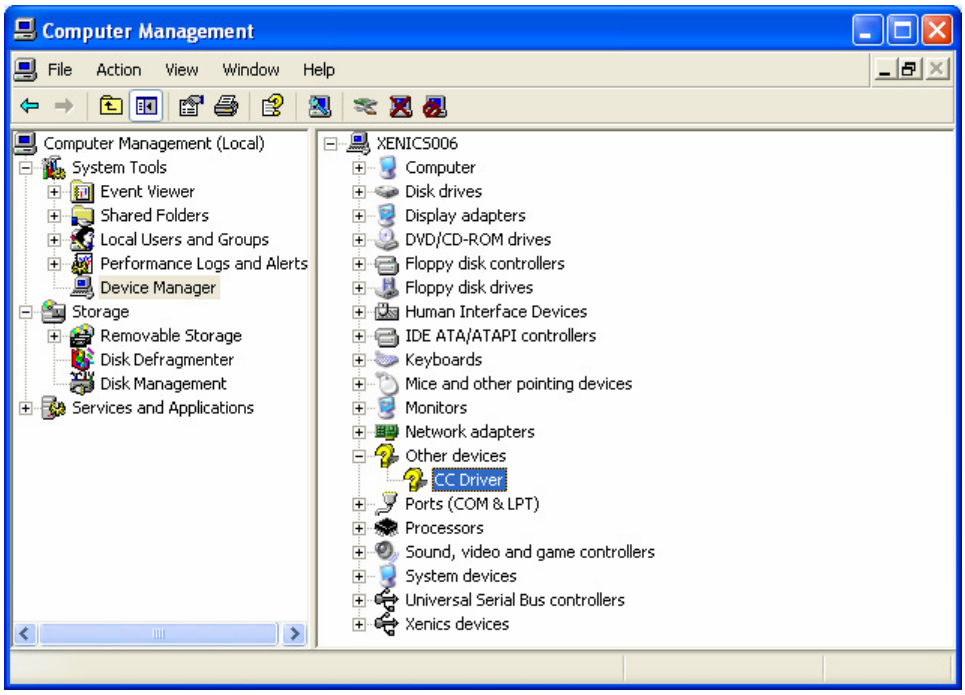
Checking the correct driver installation for the frame grabber

Checking the correct operation of the camera frame grabber driver

If the driver is installed correctly, it can be checked in Windows.

To do so, perform from the control Panel following steps:

Start->Settings->Control Panel->System->Hardware->Device Manager and under the "**Other devices**" you will find the "**CC-driver**" entry.



Automatic USB Driver installation

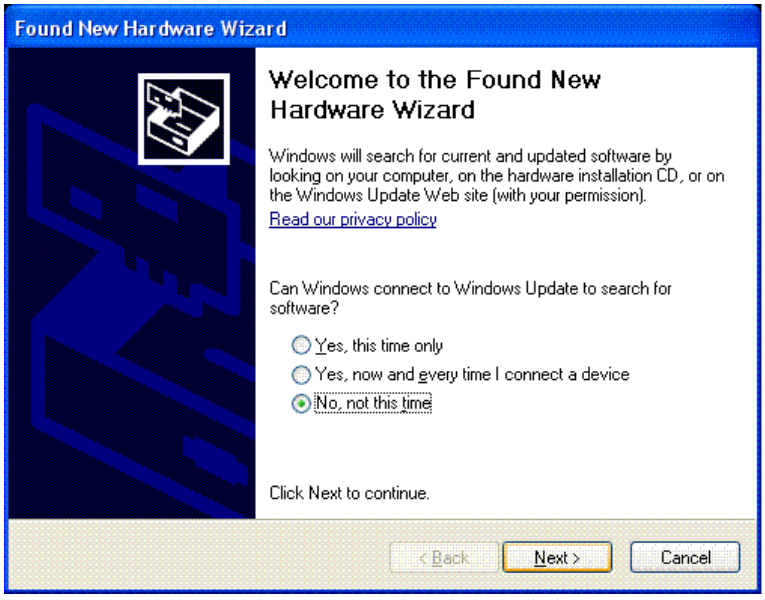
The USB driver installation is automatically done on Windows XP by means of the setup of X-Control and the camera pack of the CD-Rom. So, if you power the camera and connect the USB to the PC, cancel the windows hardware wizard and run the X-Control installer. The camera USB drivers will automatically be installed as well by installer scripts.

Manual USB Driver installation

If you do not power up the camera and cancel the hardware wizard when you run the X-Control and camerapack installer, you have to install the USB drivers manually.

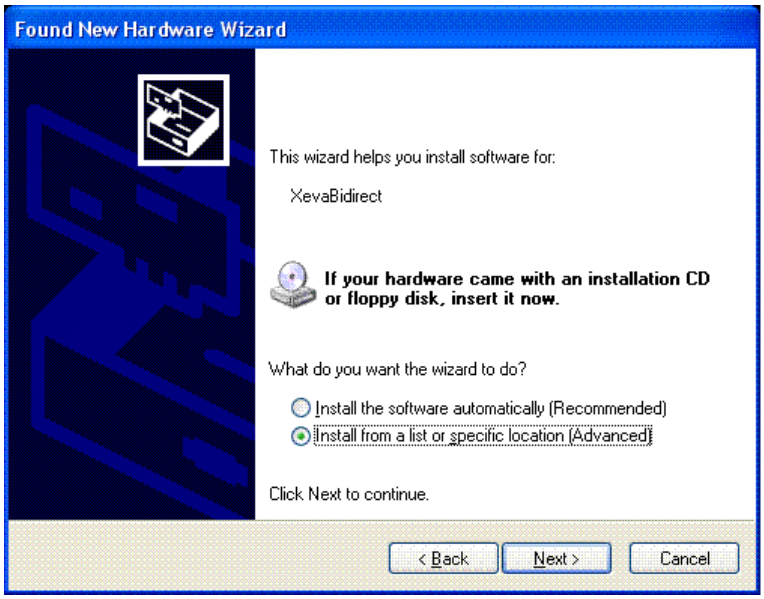
To ensure proper and safe installation of the USB driver, follow the instructions below. The procedure described assumes that the USB hub is already properly installed on your PC.

1. Pre-requisite is that your computer is started and logon to windows is done as the system Administrator.
2. Connect the supplied USB cable from the camera's USB host port to a USB port on your computer.
3. Power up the camera.
4. The found new hardware wizard will appear.

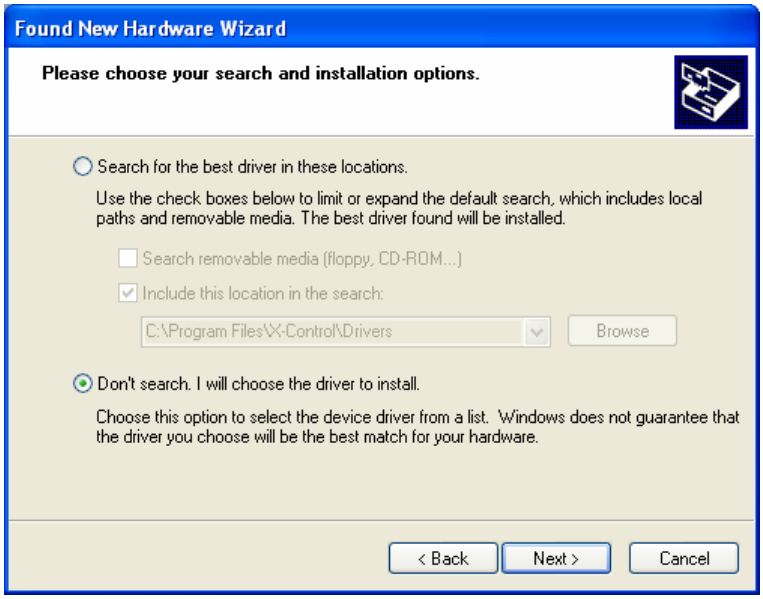

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

5. The Found New Hardware wizard will appear. Select "No, not this time" and click next.

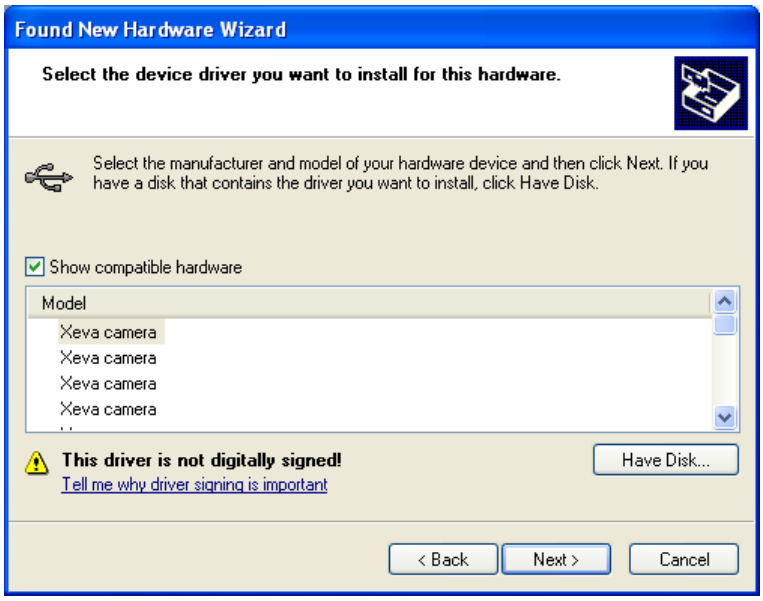
6. Select “Install from a list or specific location (Advanced)” and click next,


Found New Hardware Wizard
This wizard helps you install software for:
XevaBidirect
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

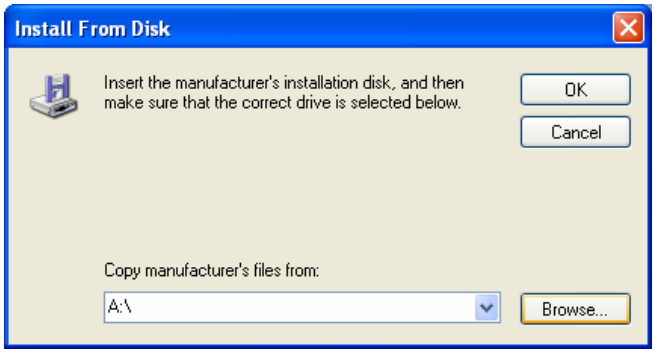
7. Select “Do not search. I will choose the driver to install”.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:\Program Files\X-Control\Drivers
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

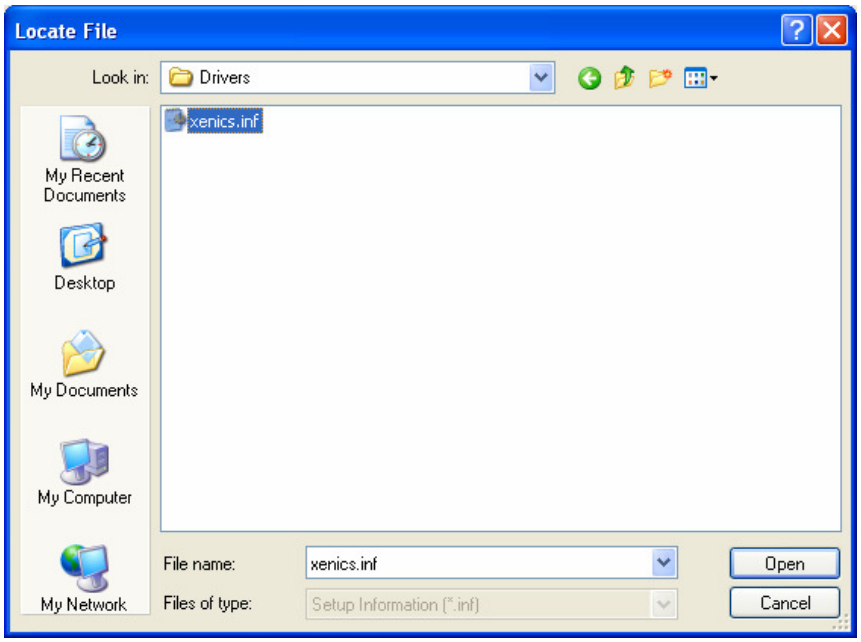
8. Press Have Disk.


Found New Hardware Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
Xeva camera
Xeva camera
Xeva camera
Xeva camera
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
< Back
Next >
Cancel

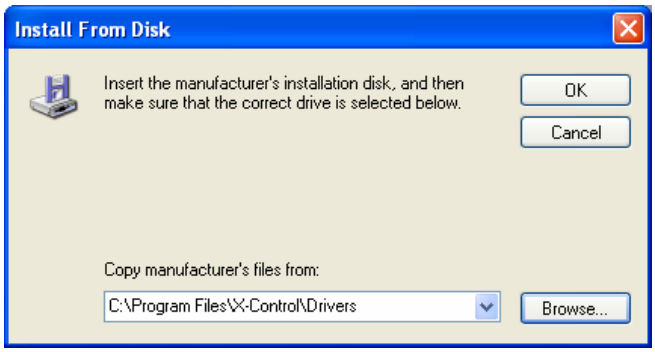
9. Press Browse.



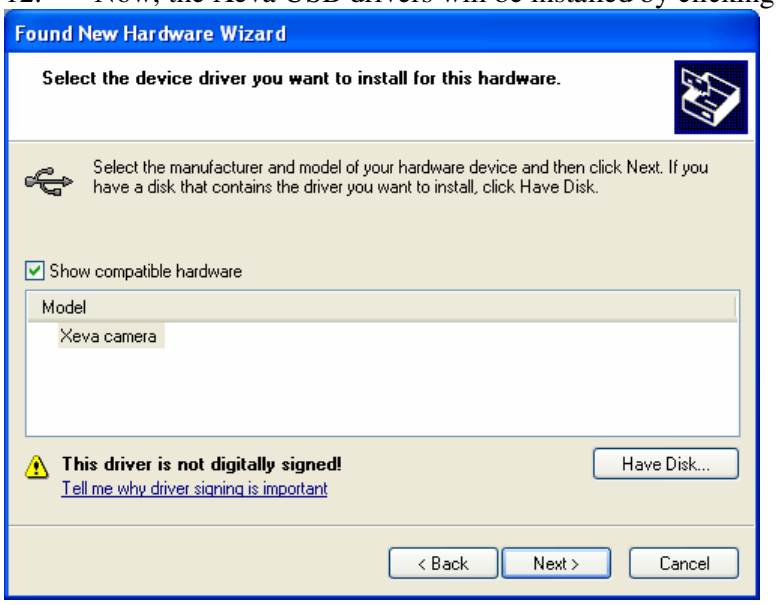
10. Browse now to the the driver subdirectory folder of X-Control, and select in the concerned folder the Xenics.inf file. Click Open on this Locate file dialog.



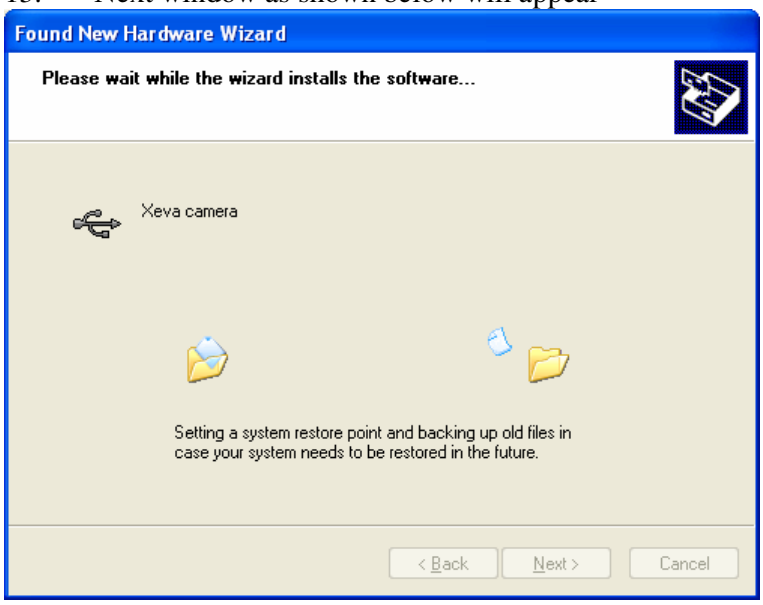
11. Click OK on the install From Disk dialog.


Install From Disk
Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.
OK
Cancel
Copy manufacturer's files from:
C:\Program Files\X-Control\Drivers
Browse...

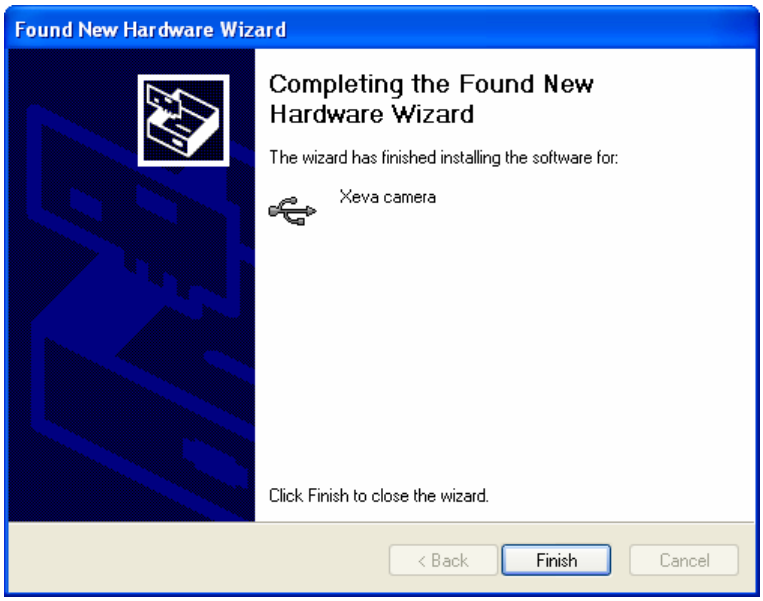
12. Now, the Xeva USB drivers will be installed by clicking the next button.


Found New Hardware Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
Xeva camera
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
< Back
Next >
Cancel

13. Next window as shown below will appear


Found New Hardware Wizard
Please wait while the wizard installs the software...
Xeva camera
Setting a system restore point and backing up old files in case your system needs to be restored in the future.
< Back
Next >
Cancel

1. The next window will appear, click “Finish”.



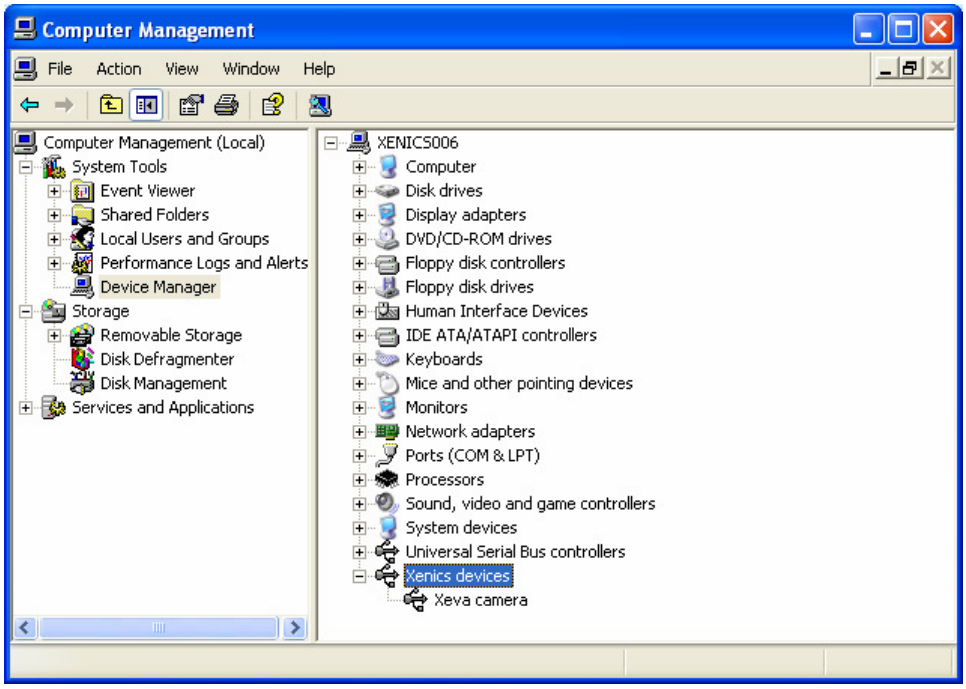
Checking the correct USB driver installation

Checking the correct operation of the camera USB driver

If the driver is installed correctly, it can be checked in Windows. Connect the USB cable from the camera to the PC and power up the camera.

To do so, perform from the control Panel following steps:

Start->Settings->Control Panel->System->Hardware->Device Manager and under the "**XenICs devices**" you will find the "**Xeva Camera**" entry.



Self starting Xeva camera

After powering up a self starting Xeva camera, the device is not directly recognized by means of the device manager.

The camera is only visible in the device manager if all settings and correction data are loaded from the flash memory in the camera.

A self starting camera contains flash memory with a small directory system. In this directory system, different file types are saved. The files are transmitted to the camera's FPGA when the camera is powered up.

The following files are stored on a self starting camera:

- logic files (the camera's VHDL logic)
- command files (binary op codes)
- correction files (binary fpn files)
- initialization files (xcf files)

When a self starting camera is powered, the default entries in the directory system will be loaded by the camera. The camera loads the first default TTB (camera logic file), the first default CMD (command file) and the first default FPN (a binary correction file).

This can take about 40 seconds (for a 256 x 320 camera). After that period of time, the camera appears in the device manager. The camera is then in an up and running state.

4. Setting up the computer for high speed operation

Prerequisites

In order to achieve a high frame rate with the XEVA **Camera Link** FPA camera a part of the computer's main memory is allocated to the frame grabber card.

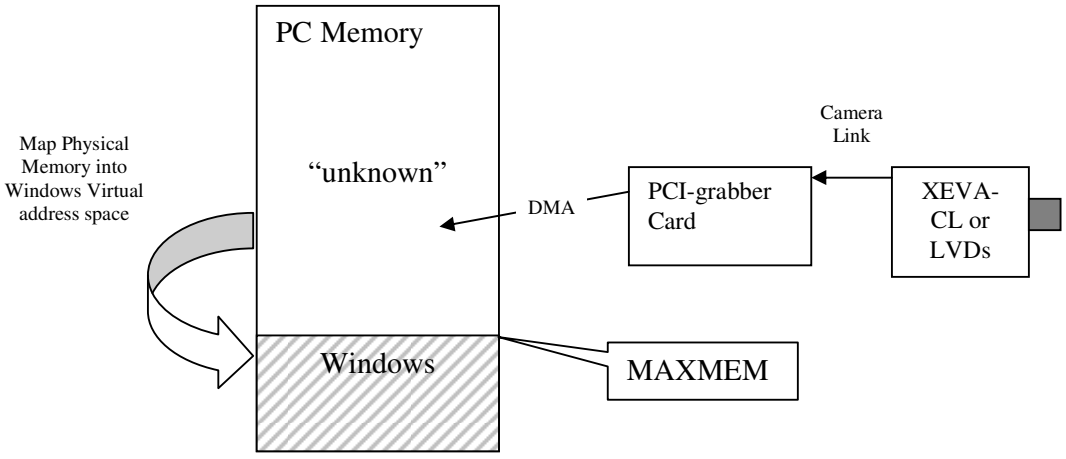
This setup is needed if you are using a Camera Link PCI frame grabber card. Consult the appropriate documentation for other PCI frame grabber cards.

Direct Memory Access operation

This mode of operation is referred as Direct Memory Access operation (DMA). In DMA mode the PCI interface card transfers image data directly into the memory of the PC. This is the fastest method for collecting data as there is no user software involved and thus no delays.

DMA operation of the X-Control software uses a bank of memory outside the normal Windows operating system memory. We refer to this memory as "Physical Memory". Firstly we must trick windows into using a limited amount of memory by defining a limit to the memory the operating system will start using at boot time.

The file BOOT.INI, which can be found in the root directory of the C: disk (or other boot disk) must be modified to limit Windows memory space.

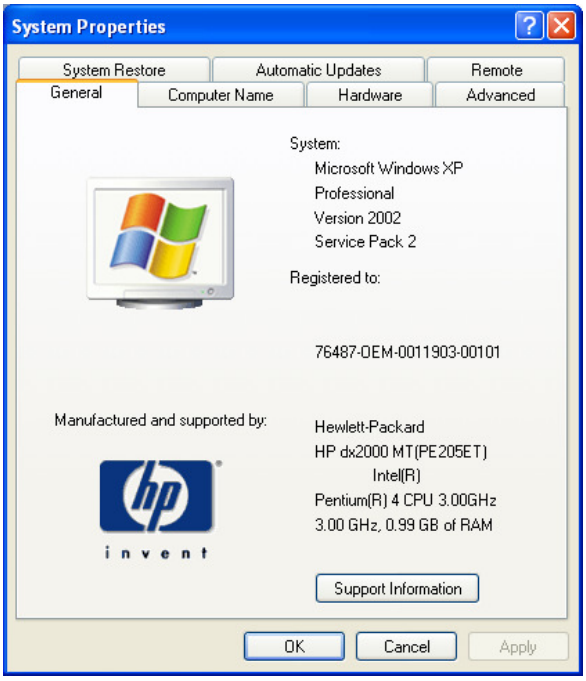


The parameter MAXMEM in the initialization file BOOT.INI restricts Windows to a region of memory, leaving the rest free for other purposes.

Modifying Boot.ini

Modify the file C:\BOOT.INI as follows (this example shows a PC with 990 MB of memory being changed to limit Windows's memory usage to 512 MB)

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Professional" /fastdetect /NoExecute=OptIn
```

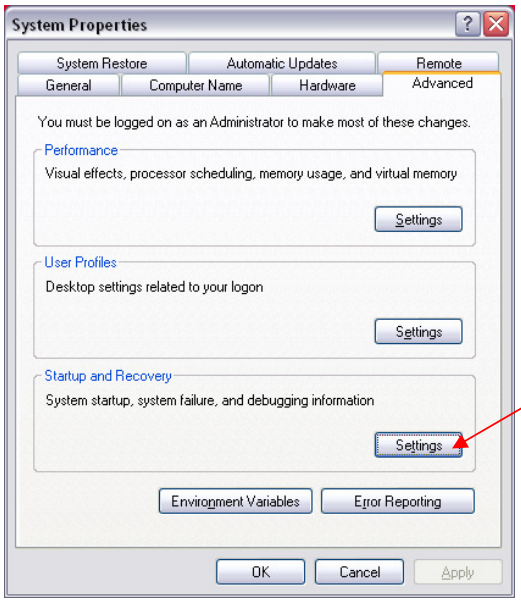


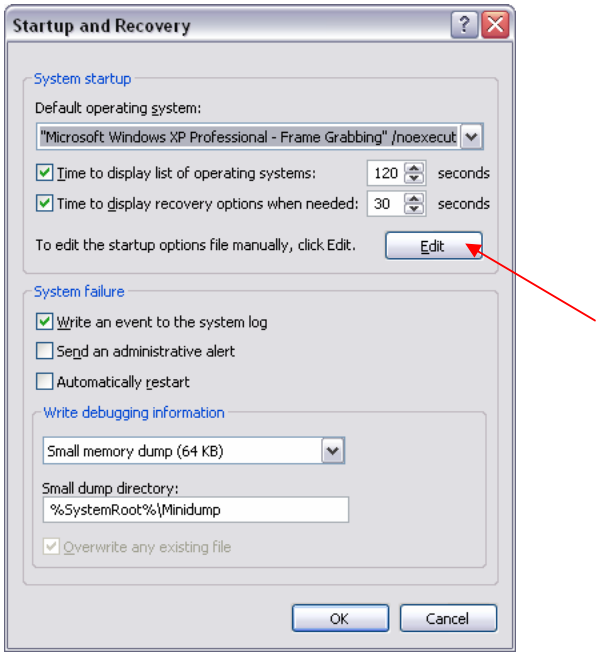
Check the memory usage of Windows using: Start/Control Panel/System

This is the resulting display.

Pressing Windows-(Pause/Break) will open the system properties dialog above. Alternatively one can navigate to this panel using Start / Control Panel / System.

Editing boot.ini is achieved by navigating the dialog as follows:



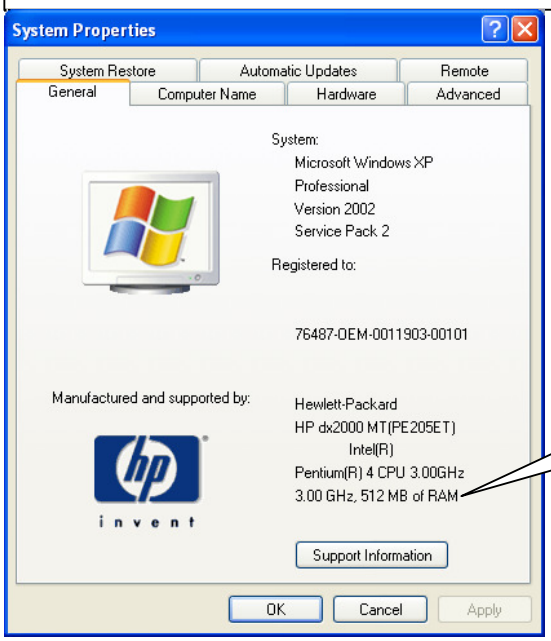


Now you can edit your boot.ini

After editing boot.ini, and ceiling the memory available to Windows, the rest of the memory is usable by the PCI frame grabber card in DMA mode. This ram will be used for the camera to store images.

Note that the memory allocation (clipping) must be done in multiples of 64 MB.

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Professional" /fastdetect /NoExecute=OptIn /MAXMEM=512
```



Windows now works in a restricted memory space, leaving the rest free for DMA usage.

Note: You can define two versions of Windows in the file BOOT.INI. You will be prompted at start-up of the PC to decide which configuration to run. (Give them different names so you can see what's what) If you do not choose within a time limit then the first configuration found will be run.

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition(1)\WINDOWS
[operating systems]
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Prof. Normal" /fastdetect /NoExecute=OptIn
multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Prof. 512 Mb" /fastdetect /NoExecute=OptIn /MAXMEM=512
```

The problem then remains of making this extra Physical memory "visible" to Windows applications by mapping it into Virtual memory.

Turning to techniques for a Kernel Driver the file CC.SYS has been modified to allow the user to obtain a pointer to physical memory that has been "mapped" into virtual memory.

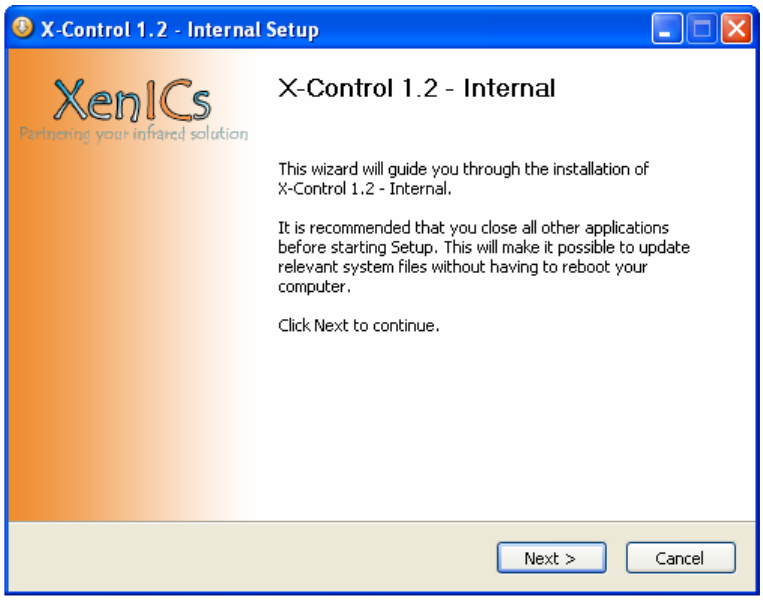
Please note that one must still configure X-Control to use the memory reserved during these steps, which is accomplished by starting X-Control and navigating to "Frame grabber" in the settings menu, however this is discussed later on in the manual.

5. X-Control-Setup

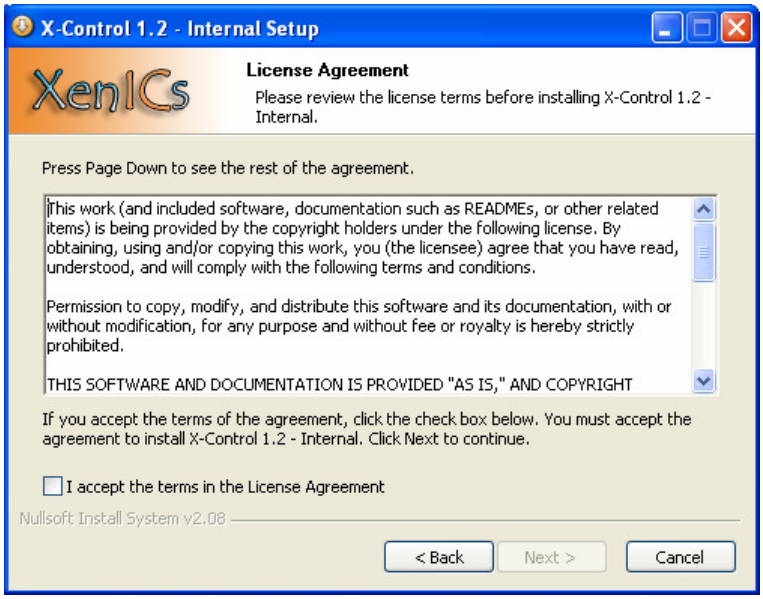
Place the X-Control-Setup.exe and camera install pack in the same folder.

Start the X-Control-Setup.exe to install X-Control and follow the instructions.

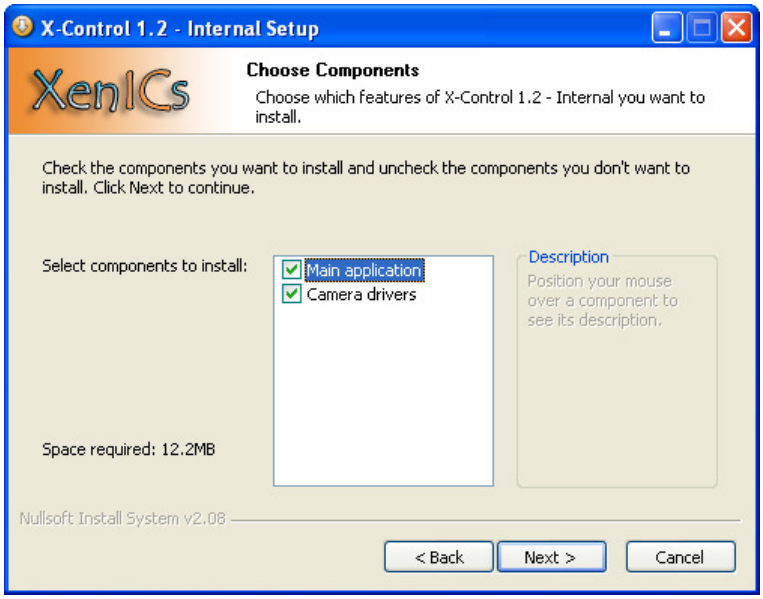
Close all other applications as indicated and click “Next >”.


X-Control 1.2 - Internal Setup
XenICs
Partnering your infrared solution
X-Control 1.2 - Internal
This wizard will guide you through the installation of X-Control 1.2 - Internal.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel

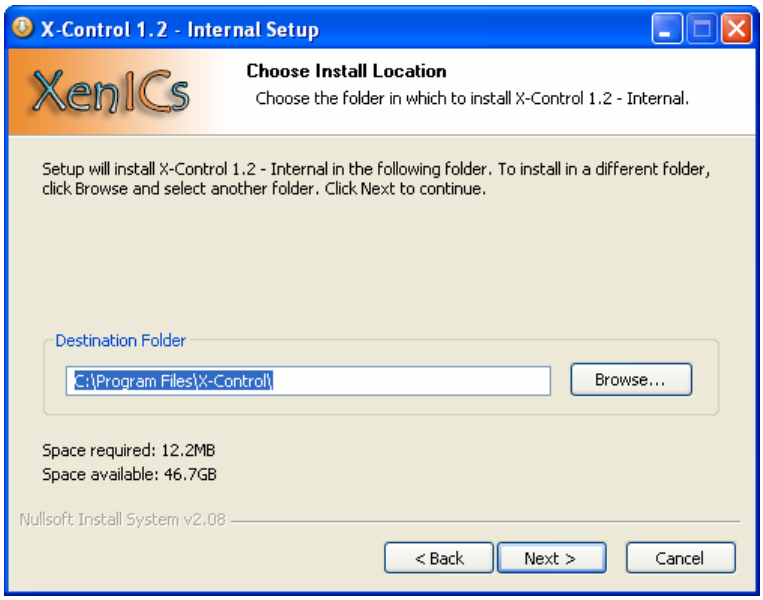
Choose “I accept the terms in the License Agreement”. And click “Next >”.


X-Control 1.2 - Internal Setup
XenICs
License Agreement
Please review the license terms before installing X-Control 1.2 - Internal.
Press Page Down to see the rest of the agreement.
This work (and included software, documentation such as READMEs, or other related items) is being provided by the copyright holders under the following license. By obtaining, using and/or copying this work, you (the licensee) agree that you have read, understood, and will comply with the following terms and conditions.
Permission to copy, modify, and distribute this software and its documentation, with or without modification, for any purpose and without fee or royalty is hereby strictly prohibited.
THIS SOFTWARE AND DOCUMENTATION IS PROVIDED "AS IS," AND COPYRIGHT
If you accept the terms of the agreement, click the check box below. You must accept the agreement to install X-Control 1.2 - Internal. Click Next to continue.
I accept the terms in the License Agreement
Nullsoft Install System v2.08
< Back
Next >
Cancel

Choose the components to install

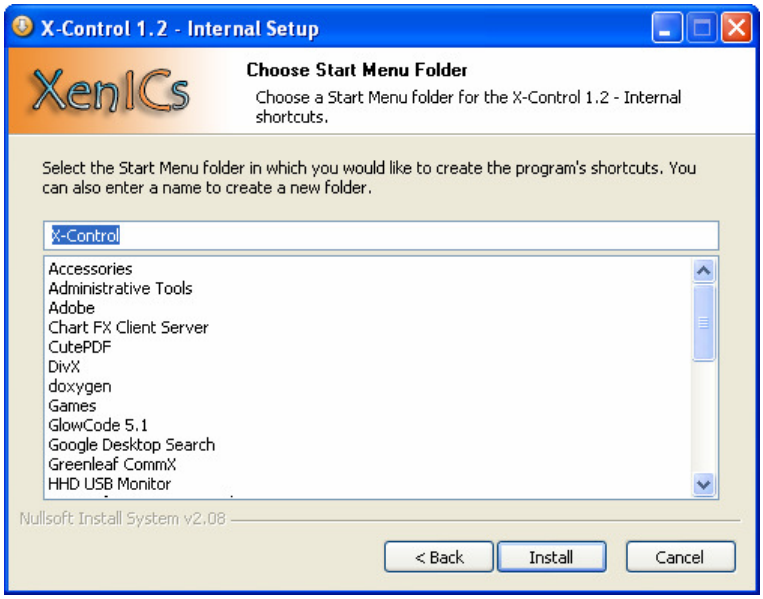

X-Control 1.2 - Internal Setup
XenICs
Choose Components
Choose which features of X-Control 1.2 - Internal you want to install.
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select components to install:
Main application
Camera drivers
Description
Position your mouse over a component to see its description.
Space required: 12.2MB
Nullsoft Install System v2.08
< Back
Next >
Cancel

Choose a destination folder if required and click “Next >”.

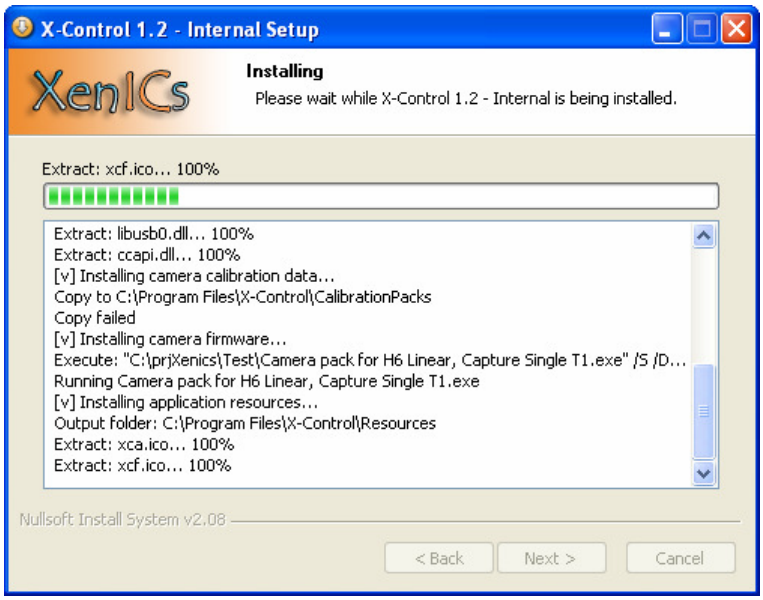

X-Control 1.2 - Internal Setup
XenICs
Choose Install Location
Choose the folder in which to install X-Control 1.2 - Internal.
Setup will install X-Control 1.2 - Internal in the following folder. To install in a different folder, click Browse and select another folder. Click Next to continue.
Destination Folder
C:\Program Files\X-Control\
Browse...
Space required: 12.2MB
Space available: 46.7GB
Nullsoft Install System v2.08
< Back
Next >
Cancel

And click “Next >”.

Choose a start menu and click “Next >”.



A progress dialog will appear.


X-Control 1.2 - Internal Setup
XenICs
Installing
Please wait while X-Control 1.2 - Internal is being installed.
Extract: xcf.ico... 100%
Extract: libusb0.dll... 100%
Extract: ccapi.dll... 100%
[v] Installing camera calibration data...
Copy to C:\Program Files\X-Control\CalibrationPacks
Copy failed
[v] Installing camera firmware...
Execute: "C:\prjXenics\Test\Camera pack for H6 Linear, Capture Single T1.exe" /S /D...
Running Camera pack for H6 Linear, Capture Single T1.exe
[v] Installing application resources...
Output folder: C:\Program Files\X-Control\Resources
Extract: xca.ico... 100%
Extract: xcf.ico... 100%
Nullsoft Install System v2.08
< Back
Next >
Cancel

(The wizard will automatically start the camera pack setups silently if the X-Control-setup.exe and camera pack(s) are available in the same folder.)

If a calibration pack is available on the installation CD received from XenICs, the Camera Setup installer will install this calibration pack in the calibration pack folder. The first time the X-Control software is started, the calibration will be loaded. So by default, your camera is calibrated by XenICs and the calibration pack is installed. The calibration pack is unique for every detector chip and related to all applied camera settings. Therefore the user shall use a calibration pack entitled to a given sensor with specific settings.

You may need to execute a calibration procedure whenever the application of the camera usage requires different settings compared to the settings used by XenICs.

The calibration is performed with X-Control and generates a related calibration pack.

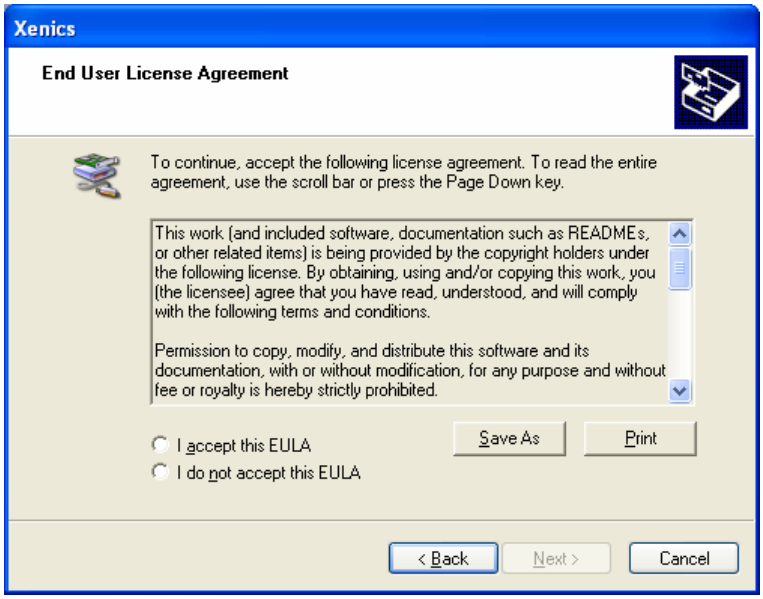
6. Camera driver installation

At this point one connects one's new XenICs camera, and cancels the windows driver wizard (Windows XP, Windows 2000 users need to manually install the driver by navigating to the Drivers folder in the X-Control install directory as described).

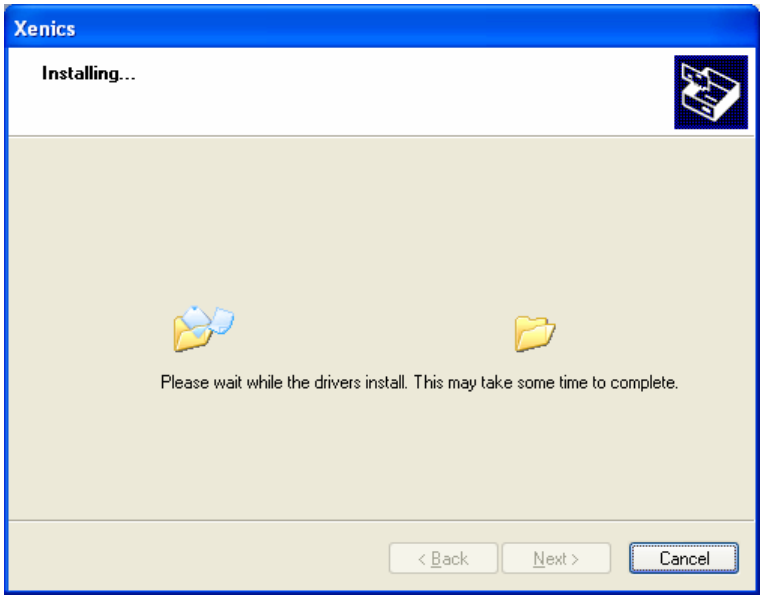
In case you are upgrading, or have already installed the driver manually, you can safely skip this procedure.

Xenics
XenICs
Partnering your infrared solution
Welcome to the Xeva camera installer!
This wizard will walk you through updating the drivers for your camera.
To continue, click Next.
< Back
Next >
Cancel

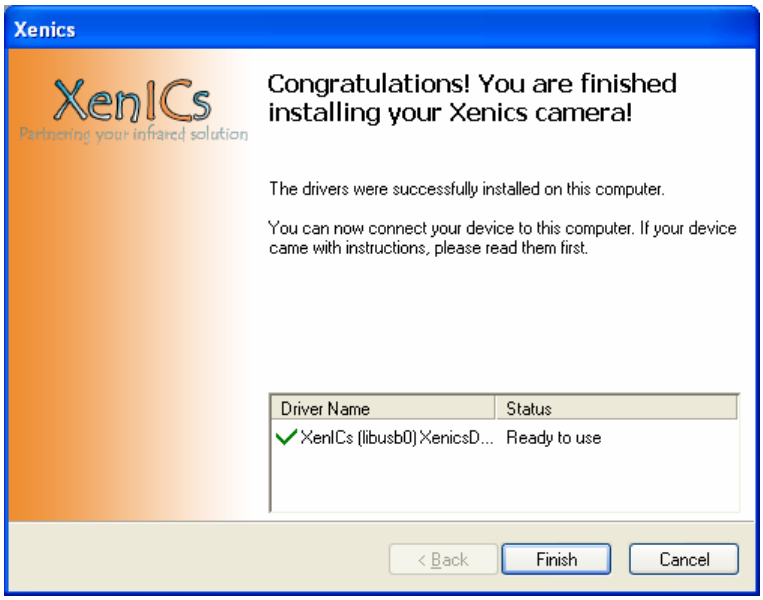
Select "I accept this EULA"


Xenics
End User License Agreement
To continue, accept the following license agreement. To read the entire agreement, use the scroll bar or press the Page Down key.
This work (and included software, documentation such as READMEs, or other related items) is being provided by the copyright holders under the following license. By obtaining, using and/or copying this work, you (the licensee) agree that you have read, understood, and will comply with the following terms and conditions.
Permission to copy, modify, and distribute this software and its documentation, with or without modification, for any purpose and without fee or royalty is hereby strictly prohibited.
I accept this EULA
I do not accept this EULA
Save As
Print
< Back
Next >
Cancel

A progress dialog indicates the automatic driver installation.



The Next dialog will indicate the end of the driver's installation procedure.


Xenics
XenICs
Partnering your infrared solution
Congratulations! You are finished installing your Xenics camera!
The drivers were successfully installed on this computer.
You can now connect your device to this computer. If your device came with instructions, please read them first.
Driver Name
Status
XenICs (libusb0) XenicsD...
Ready to use
< Back
Finish
Cancel

Your driver has now been successfully updated to the latest revision.

7. Safety and precautions

Before installation or use, be sure to carefully read all the instructions in this section in order to ensure long, trouble-free operation.
• Be sure to follow all the precautionary instructions in this section, which contain important warnings regarding safety.
• After reading, keep this manual for future reference.

• Use the camera unit only with the power supply unit delivered by XenICs. Using another voltage than specified may result in fire or electric shock. The use of an unspecified power supply may result in fire or electric shock.

• Avoid installing or mounting the camera and power supply in unstable locations, such as on a rickety table or a slanted surface. So, do not install the equipment in an unstable or inclined location or locations subject to vibration or impact. Otherwise, the equipment may topple over, and result in falling down and cause personal injury.

• Do not install the unit outdoors since it is designed for indoor use. If installed outdoors, this will accelerate the aging of all parts.

• Do not expose the camera to humidity like rain, water, .. Do not use the equipment in locations subject to water splashes. It may result in an electric shock and damage the camera.

• Should any of the following abnormal conditions be present during the use of the camera, immediately switch off the power, and disconnect the power supply. Do not attempt to further use the camera and power supply because a fire or electric shock may result.
• If you detect smoke or a strange smell coming from the camera.
• If ingress of water or a foreign object enters the camera.
• If the unit falls, is dropped or the camera housing breaks.
• If the power supply cord is damaged (exposure of core or disconnection).

• Do not open, disassemble, repair, nor modify the housing of the camera to prevent a fire or electric shock. Refer all inspection, adjustment, cleaning and repair work to XenICs.

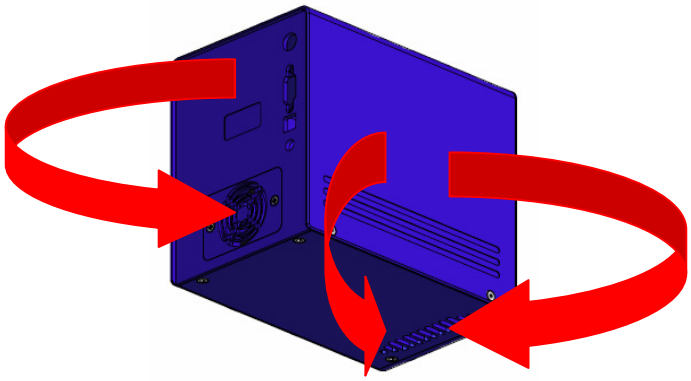
• Do not place anything on the equipment. If metallic objects, liquid, or other foreign matter enters the equipment, fire or electric shock may result.

• Do not insert or drop metal pieces or flammable materials into the camera ventilation slots as this may result in fire or electric shock.

• Once you stop the software (X-Control, X-Vision, Xeva-FPA or other custom developed software), never leave the power cable connected to the camera if the camera is not anymore in use. Depending on the settings what you have set in the software, after stopping the software, some components of the camera can still remain under power (by the connected power supply). This might result in damaging your camera and/or the infra red device.

• Avoid installing the camera in dusty locations and locations exposed to the direct sunlight, near the heaters, or in locations with high moisture, oil fumes, steam, smoke, doing otherwise may result in fire or electric shock and/or damage the camera.

• Do not cover the camera with a cloth or other objects to allow cooling of the camera. Do not cover the ventilation slots as this may result in fire or electric shock. Note that some cameras have as well ventilation slots on the bottom plate of the camera. For this type of camera, small spacers are required so that the air can flow through the ventilation slots in the bottom plate in the camera.



• The fan disperses the heat as it radiates away from the heat sink. If the airflow is blocked by an obstacle or by dust, the thermoelectric cooler may run hotter than normal and the camera body could be overheated, causing damage to some of the more sensitive components. After a period of operation, dust will be collected on the dust filter and the cooling fan. It may be necessary to clear away the dust with vacuum cleaner regularly. Never clean a turning fan ! Do not apply too much pressure on the dust filter eventually and on the fan. This may damage the fan; this may block the fan motor or make turn the fan irregularly hitting the dust filter and the fan support spikes.

• Do not handle the camera and cables roughly (USB and other camera interface cable(s), power supply and cable). This can damage cables and camera.

• Avoid giving a strong shock against the camera body. If your camera is used in a system where its camera connector is subjected to strong repetitive shocks, its camera connector is possible to break down. If you intend to use your camera in such a situation, if possible, bundle and fix a camera cable in the place near the camera, and do not transmit a shock to the camera connector.

• Install the camera in locations where the temperature range does not exceed –0°C to +70°C and no dew condensation is formed.

• To clean, wipe with a soft cloth. Never use benzene, thinner or chemically-treated towel to avoid damage to the camera's finish. So the anodized aluminum camera housing can be cleaned with a soft non-static cloth and glass cleaner. Never spray liquids directly on the XenICs camera. Apply cleaning solution to the cloth, and then wipe the camera body with an isopropyl-alcohol dampened cloth.

• During storage and operation the XenICs camera's optical window will collect dust particles and other specks of dirt. Be careful with cleaning this window! First try to clean the window with pressurized oil free air or applicable cleaning gas out of an aerosol dispenser. If this is not sufficient, try to clean the optical surface gently wiping the dirt away with a soft, lint-free, non-static cloth or lens tissue; avoid heavy rubbing, which may scratch or break the optical glass. Avoid large temperature differences between optical glass and cleaning gas or cleaning fluids.

• The camera components are sensitive to mechanical, electric, and thermal shock. Follow these guidelines for safe operation of the camera:

1. If the camera is supported on a moving device, such as a manipulator, optical mounting, microscope, telescope, or etc…, be sure to secure the cable with cable ties and allow enough slack so that the cable connector is not stressed or broken during movement. If the cables are bended regularly, contact XenICs about cable lifetime. In some cases it might be necessary to apply special flexible robot cables.
2. Always ground yourself to dissipate electrostatic charge before handling the camera.
3. Try to avoid contact with any of the electrical components of the camera.
4. Lightning can damage the camera and interface, even indirectly. Always disconnect the XenICs camera and remove it from grounded equipment whenever there is thunderstorm activity in the direct area.

• Picture quality may suffer if camera cables are wired close to other electrical equipment, such as fluorescent lamps. In such cases, reroute the wiring.

• For a USB camera with a USB interface cable, the picture quality may suffer in case the USB cable is close to electro magnetic fields or electrical equipment. In such cases, reroute or shield the wiring.

• Images may become distorted or roll if the camera is used in locations influenced by strong electrical or magnetic fields like motors, transformers. In such cases, install the cables inside a shielded cable conduit.

• Do not install the camera in locations where solvents or chemicals are used, as exposure to such chemicals could damage it.

• Do not cool liquid cooled cameras too much. Respect the dew point temperature. If the air is cooled lower than the dew point temperature, water can condensate on the cooling tubes and in the camera. . It may result in an electric shock and damage the camera. Note that the dew point temperature depends on the relative humidity of the ambient air.

• Respect rigorous following environmental conditions
  - Always store or operate the camera in none condense conditions.
  - Never spray fluids onto the camera!
  - Make sure the camera is kept out of electrical conductive and dusty zones.
  - To guarantee sensor temperature ≤ 293K, the operating temperature shall be between -0 to +70°C. Sudden changes in ambient temperature and/or humidity shall be avoided.
  - Storage temperature: -0 to +70 °C.

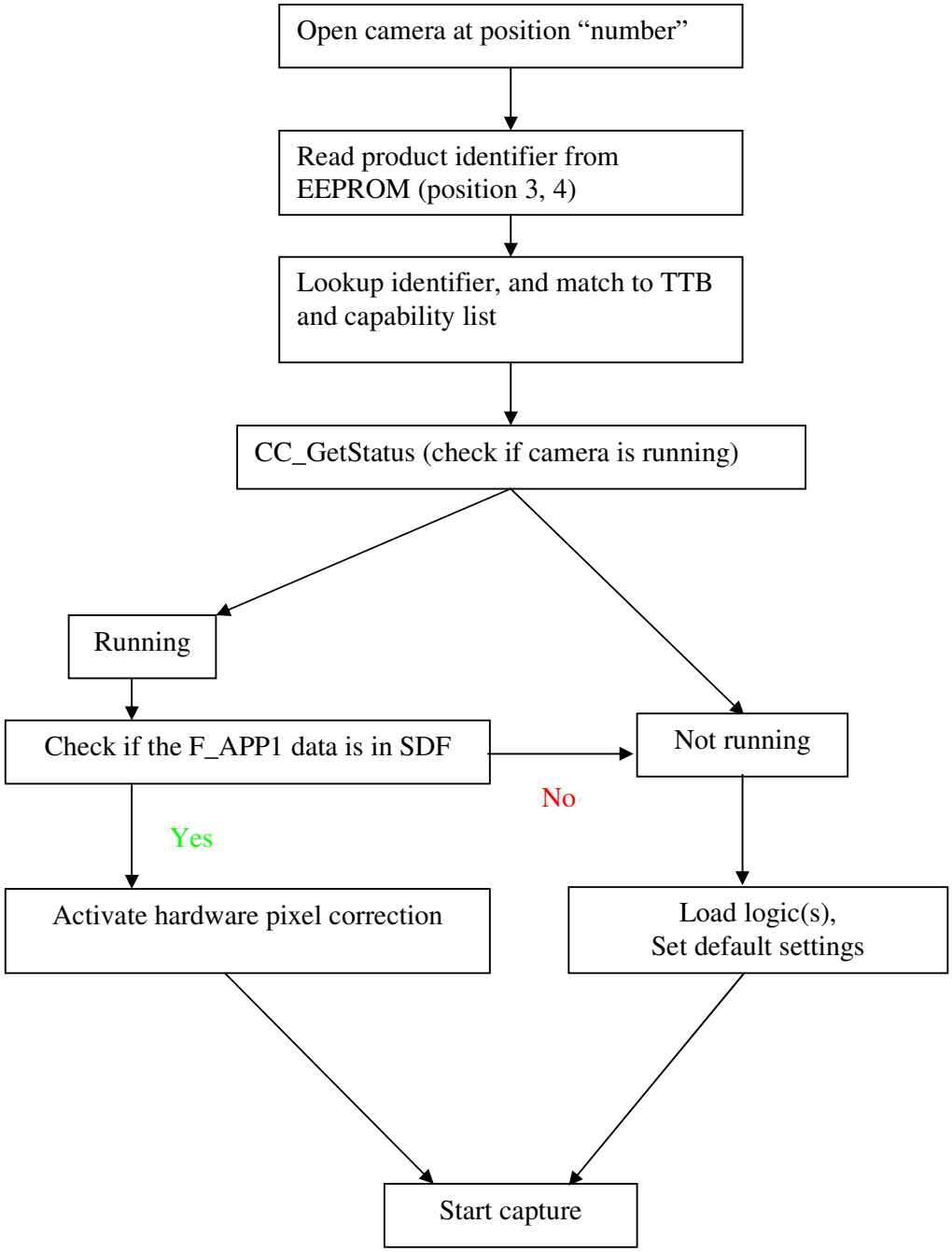
Connecting and starting the camera

It is important to follow this procedure rigorous, to avoid the damage of the camera or a USB port of your PC:

For routine operation and start-up:

- Connect USB cable first
- Connect other cables (VGA, LVDS, Camera Link, …)
- Connect power supply and power up the camera

8. Camera start up procedure in X-Control

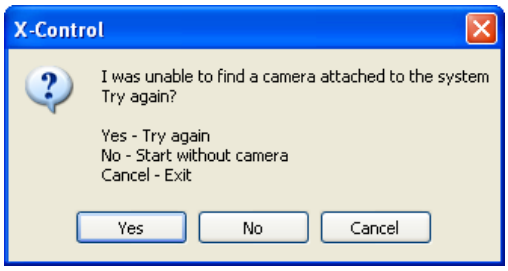

Open camera at position “number”
Read product identifier from EEPROM (position 3, 4)
Lookup identifier, and match to TTB and capability list
CC_GetStatus (check if camera is running)
Running
Not running
Check if the F_APP1 data is in SDF
No
Yes
Activate hardware pixel correction
Load logic(s), Set default settings
Start capture

No camera pack installed

In case you have no camera pack installed for the camera you have just attached, X-Control will warn you of this. (A message stating “camera VHDL logic not found” will pop up. Install the appropriate Camera pack and start X-Control again.).

No camera detected

If no camera is detected on the USB ports of PC, X-Control will warn you of this.



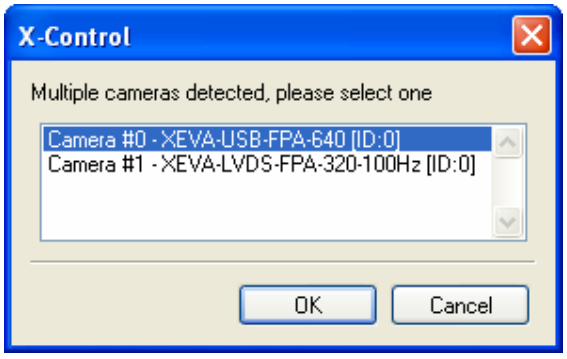
Now you have the possibility to connect your camera properly to the PC (and push yes to start X-Control).

If No is selected in previous mentioned dialog, X-Control will be started in offline mode (see corresponding camera control panel).

Camera detection

The xcamera.dll detects the connected and recognized cameras on the USB ports of the PC in question.

In case that there is more than one camera connected to the PC, the user is given the opportunity to select one of the different detected cameras.



In fact, the user will, by means of this dialog, select the corresponding USB device number of the camera.

Product identifier

Once the device number is selected, the product identifier is read from the EEPROM by XCamera.dll.

This identifier is used to determine the VHDL logic which needs to be loaded (Camera packs), and determines the size of the buffers allocated in the software, amongst other things.

Camera status

After this initial identification step, the state of the attached camera is determined.

Self starting camera

When a self starting camera is powered, the default entries in its flash memory will have been loaded at camera start up. The camera loads the first default TTB (camera logic file), the first default CMD (command file) and the first default FPN (a binary correction file). This can take about 40 seconds (for a 256 x 320 camera). After that period of time, the camera appears in the device manager. The concerned camera is then in an up and running status.

An internal function call indicates that the camera is up and running (for a self starting camera). The splash dialog of X-Control indicates this at start up.

If the camera is self started, the default setting file (xcf file) on the directory system in the camera is loaded by X-Control to synchronize its user interface.

Not a self starting camera

If a camera is not running, the TTB file (logic file) and default settings will be loaded. Please note that the XCamera.dll looks for ttb's in the current directory first (.\ttb\). If one can not be found there, it looks for it in the X-Control installation folder (c:\program files\x-control\ttb or wherever it was installed).

If a calibration pack is loaded at start up of X-Control, the concerned settings of the calibration pack will be loaded.

If no calibration pack is loaded at startup, X-Control will load a default initialization file with auto_XXXX.xcf as its name (note that the filename contains 4 digits, indicating the camera type (product identifier)).

These initialization files can be found in the settings subdirectory of X-Control.

Camera logic files

Different camera types require different **"TTB"** files. By default XenICs delivers the correct TTB file in a camera pack installer. So the user does not have to take care about the TTB file.

However, if the user has different version of XenICs cameras, it can be useful to run his/her cameras one by one from the same software environment (only one camera can be run at a given time within X-Control). To ensure that he/she can run his/her cameras within X-Control, the corresponding **"TTB"** files needs to be set (by means of the corresponding camera pack installers). For users with different types of cameras, XenICs delivers the different camera pack installers. These **"TTB"** files have to be placed in the TTB subdirectory of the X-Control folder by means of the camera pack installer.

9. Getting around the X-Control software

start capturing (see File menu)

Stop capturing (see File menu)

Load an image from file (16 bit for CSV files) otherwise an 8 bit image is upscaled to the sensor bit size

Save a single image

Save a sequence of images:

1. Start capture
2. Push save a sequence button.
3. Enter filename.
4. To stop push save a sequence button again.

Make elapsed snapshots:

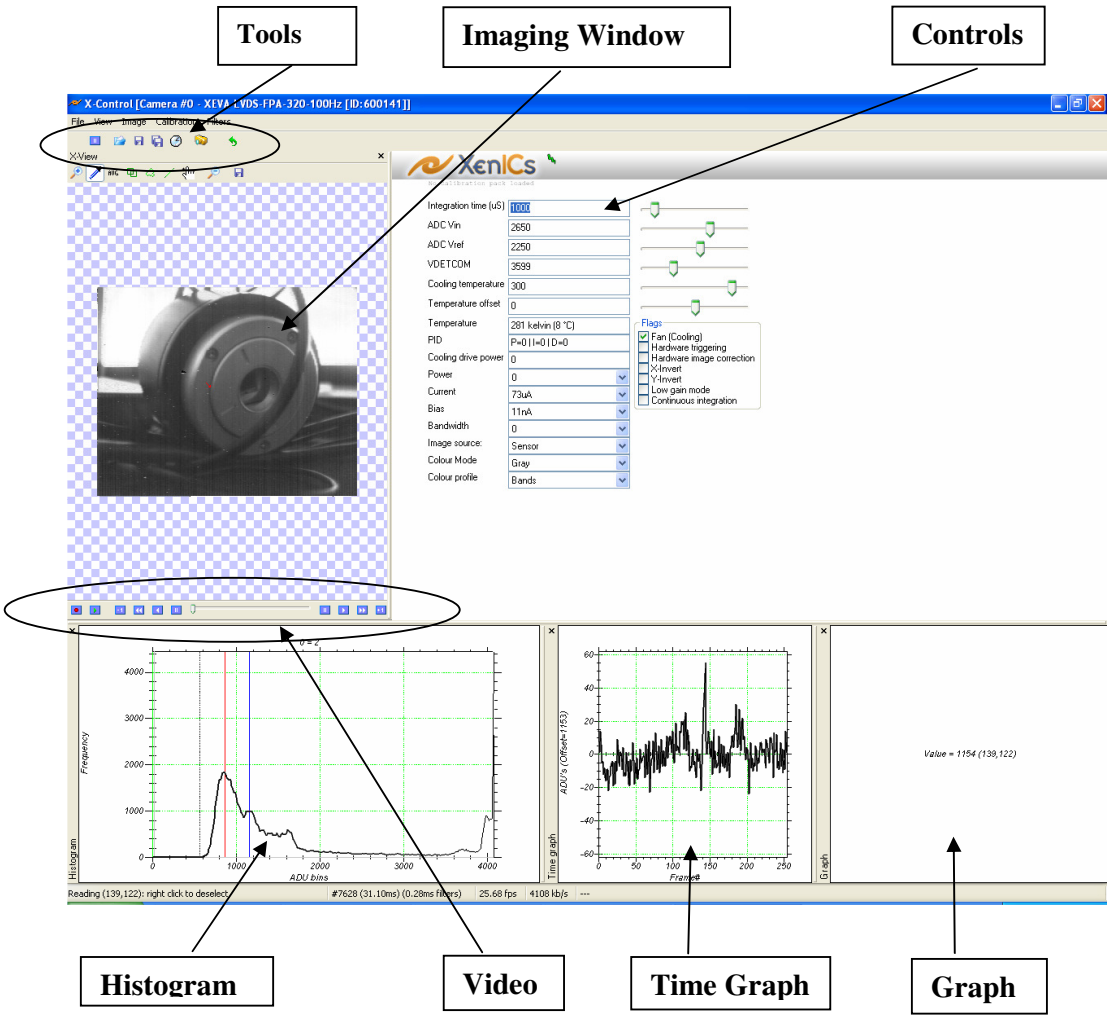
1. Start capture.
2. Push elapsed snapshot button.
3. Enter Filename.
4. Set time period
5. To stop push elapsed snapshot button again.

Make image snapshots:

1. Start capture.
2. Push image snapshot button.
3. Enter Filename.
4. To stop push image snapshot button again.

Restore Default camera settings from ini file or from camera

Please note that the **controls** depend on the type of camera!



Plug in the power to the camera and connect it to the PC.

The imaging window displays the image content of the camera. The refresh rate of the image can strongly vary depending on the type of image capturing port:

- USB port used (USB 1.1. or USB 2.0)
- Camera link
- LVDS

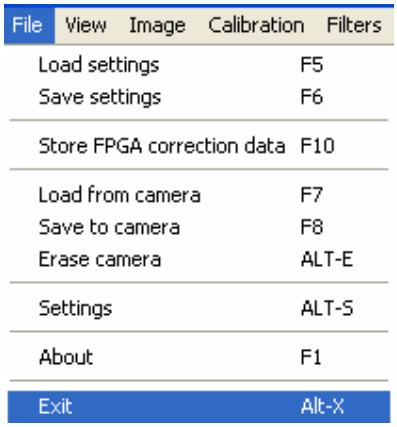
The refresh rate of the image is dependant on the PC speed, on the processing capacity of the PC and on the image processing which is applied.

The camera's cooling should run by preference too. At this moment you might get an image in the imaging window (sharp/not sharp, bright/not bright) depending how much light enters into the camera, setting the focus position, and various settings in the software (see further). By default the settings in the software are set according the installed device considering a daylight illumination.

After initial adjustment of the camera settings (by means of the camera controls) uses the image in the X-View imaging window to adjust the optics, optimize integration time and other operational parameters of the sensor.

By means of load an image, the user can load any previously saved image (in all the supported file types) to analyze with X-Control.

6.10. File menu



Load settings
This permits you to load initialization files with two formats. The selection of format of file to load is done by means of the file type combo box on the open file dialog.

Save settings
This saves the settings to an ini file or an xcf file.
The selection of the format of the file to save is done by means of the file type combo box on the save file dialog.

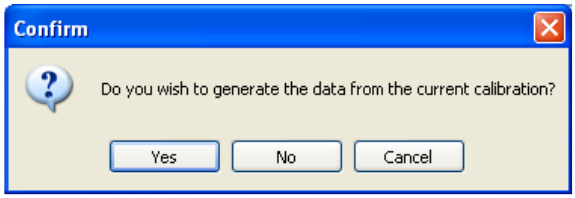
If no valid calibration pack is loaded at X-Control startup, X-Control will load a default initialization file with auto_XXXX.xcf as extension (note that the filename ends with 4 digits, indicating the camera type). This initialization file can be found in the settings subdirectory of X-Control. The format of the initialization file to save or to load by means of this file menu options is the same as the default initialization files in the settings subdirectory of X-Control.

Store FPGA correction data

A calibration can be stored in hardware, i.e., the camera FPGA.

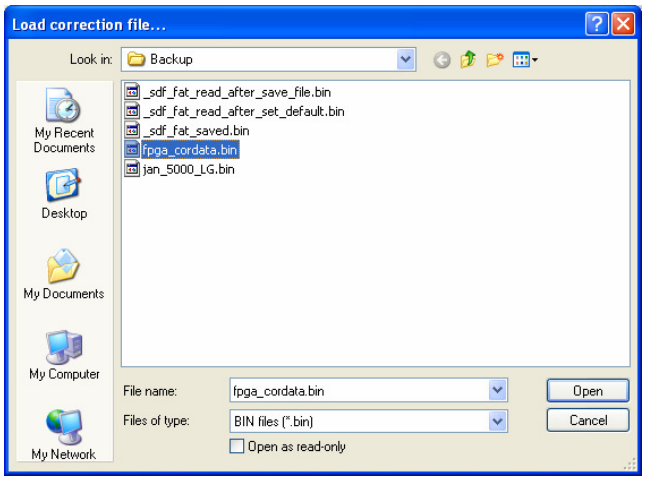
Not used in combination with an XPORT and XMID camera.

If the user chooses to store FPGA correction data using the file menu panel, the user has the ability to upload the binary correction data from the calibration pack or she/he can upload a correction file made by means of another application.



Push yes in case you want to generate a binary correction file from the loaded calibration pack.

Push no if you want to browse to a specific binary correction file on disk of your PC. In this case, the concerned open file dialog is shown.



When all the data is uploaded to the camera, the static hardware pixel replacement is done on the FPGA of the concerned camera, resulting in higher frame rates.

Note that if a reduced window of interest is set by means of the tool menu, only the concerned correction data of the selected window will be uploaded to the FPGA.

Load from camera
Load the settings stored in camera Flash memory into the X-Control user interface[5]

Save to camera
Stores the settings, logic file(s) and calibration file used in X-Control to camera Flash memory (this makes the camera self starting[6]).

Erase camera
Erase the camera's flash memory. (this wipes all the correction data, and logic file(s) from the camera[7]

Settings
The Settings menu defines the start-up settings for of X-Control, X-Api (e.g., calibration packs) and Fast Capture (e.g., Memory allocation). More info on the different Settings Menus is given below (setting dialog).

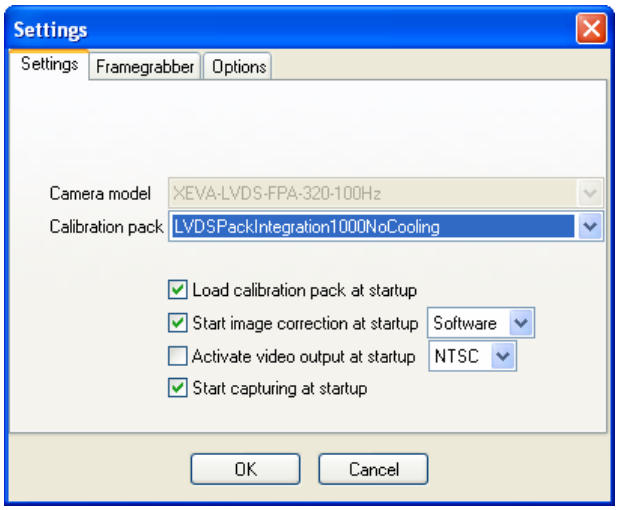
About
Software info

Exit

[5] The flash memory operations only work on cameras which effectively support it (contact your sales representative)
[6] Same remark.
[7] Same remark.

6.10. Settings Dialog

The X-control tab on the file menu allows the user to define some of the start-up conditions.



Setting tab
The setting tab allows you to change the camera model and to define the Calibration pack to be used by X-Control.

The Calibration pack stores non-uniformity correction data as well as the settings used to make these calibrations. After selecting the calibration pack, X-Control will upload the settings of the concerned calibration pack to the camera.

Note that only calibration packs can only be loaded in the camera if the unique identifier in the EEPROM of the camera corresponds with the identifier in the filename of calibration pack.
If this is not the case the calibration pack can not be loaded by the X-Control software. In addition, only calibration packs which match the attached camera's product identifier can be loaded by X-Control. This is because different TTB's affect the resulting image coming from the camera.

If the concerned calibration pack does not correspond to these 2 criteria, the calibration pack will not be loaded. A corresponding message will be shown in the controls pane of the X-Control application (Invalid calibration).

Frame grabber tab

The **frame grabber** tab is only used if a Vector PCI frame grabber card is installed for the XEVA CAMERA LINK CAMERA. This tab defines the settings related to the memory allocation for the high speed camera DMA mode.

The high speed XEVA-CL-FPA camera can be operated from X-Control in two modes. A Direct Memory Access (DMA) and a Preview mode[8].

DMA Mode

In Direct Memory Access operation the PCI interface card transfers image data directly into the memory of the PC. This is the fastest method collecting data as there is no user software involved and thus no delays.

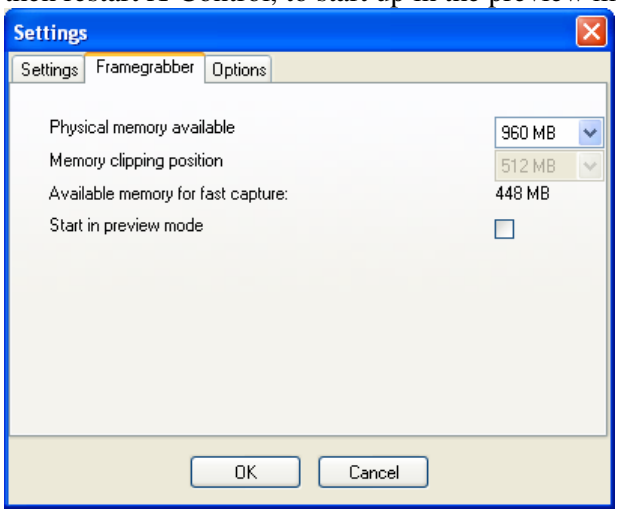
"Physical memory available" has to be selected manually and indicates the physical memory available in the PC. In this case, The PC contained 1024 Ram, but the system recognized only 990 MB (see Setting up the computer for high speed operation). So the selected Physical memory has to be 960 MB.

The "memory clipping position" and "available memory for fast capture" indicate the part of the physical memory that is available for storing images to memory. Note that the memory allocation must be done in multiples of 64 MB.

Preview Mode

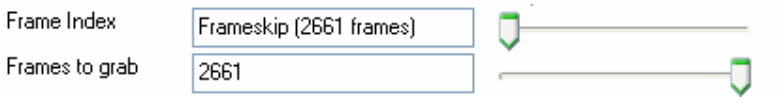
In the Preview mode the image data is not transferred to the PC memory but is directly displayed on the screen. Since the PC cannot follow the highest frame rate of the camera this mode will result in lower frame rates.

Check the "Start in preview mode" box in the "Settings-Fast capture" menu, exit and then restart X-Control, to start up in the preview mode.

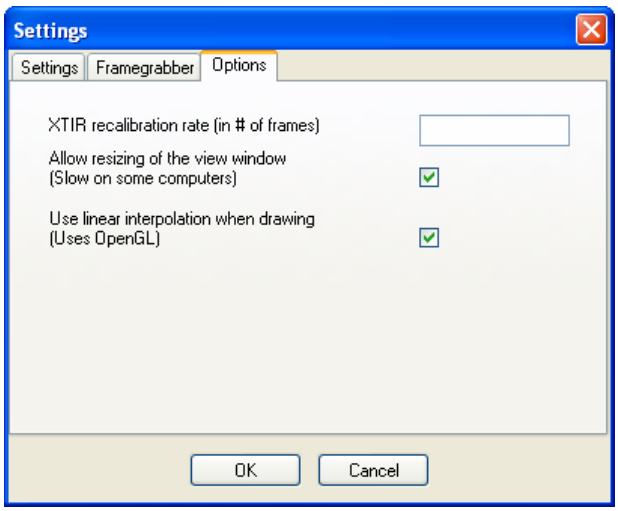


[8] Preview mode functionality depends on the firmware loaded into the camera (contact your sales representative)

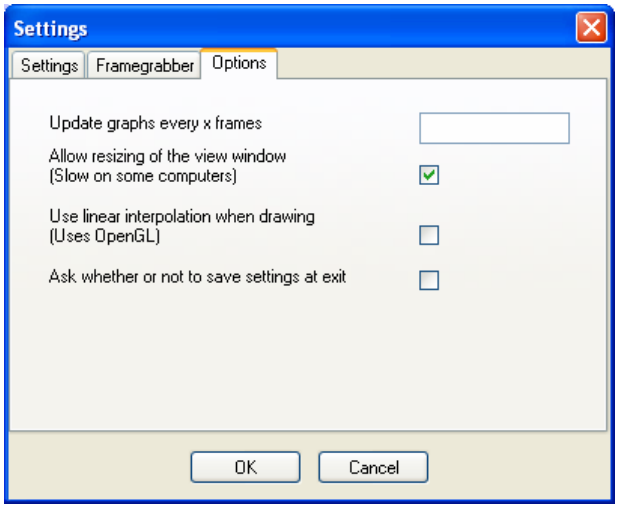
If the “Start in preview mode” box in the “Framegrabber” tab is not selected, X-Control will display additional controls for the fast capture mode.



Option tab



In the **options** tab, the XTIR recalibration rate can be entered (in number of frames). After capturing this number of frames, the shutter will automatically close and open. The number of frames should be higher than 160. This setting is only valid for the XPORT or XTIR camera



Update graphs every x frames. This setting has to be set to an unsigned integer. According this setting, following views will be updated.

- Histogram
- Graph
- Time Graph

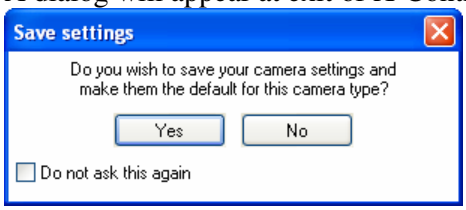
The allow resizing checkbox will enable that the image display will resize according the available space. If not, the display is done according the camera pixel size (not resizable display).

Use linear interpolation when drawing enables or disables this setting.

Ask whether or not to save settings at exit.

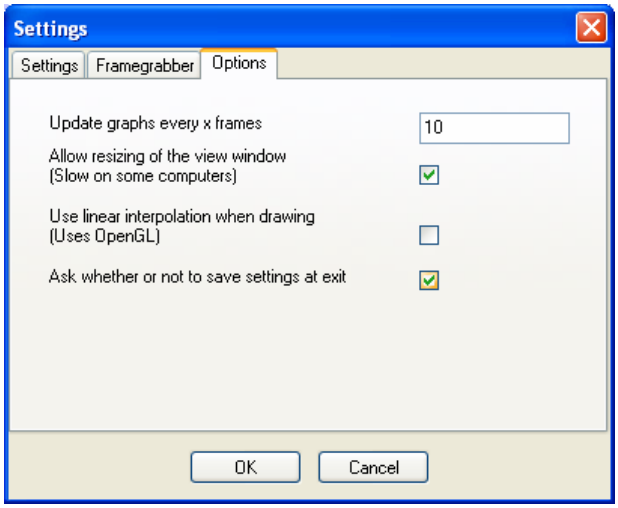
If no valid calibration pack is loaded at X-Control startup, X-Control will load a default initialization file with auto_XXXX.xcf as extension (note that the filename ends with 4 digits, indicating the camera type). This initialization file can be found in the settings subdirectory of X-Control.

When the user shuts down in those circumstances X-Control, the user will be asked if the settings have to be saved in the corresponding initialization file.
A dialog will appear at exit of X-Control:


Save settings
Do you wish to save your camera settings and make them the default for this camera type?
Yes
No
Do not ask this again

If the user will confirm by “YES”, the settings will be stored in the default initialization file with auto_XXXX.xcf as extension. If “YES” and “Do not ask me again” is checked, the setting will always be saved if no calibration pack is loaded.

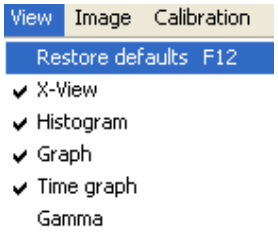
If the user will ignore by “No”, the settings will not be stored in the default initialization file with auto_XXXX.xcf as extension. If “No” and “Do not ask me again” is checked, the setting will never be saved.



If once “No” and “Do not ask me again” is chosen on the Save Settings dialog, the Save settings dialog will never appear again. To be able to show back the Save Settings dialog, check again the checkbox of “Ask whether or not to save settings at

exit” on the Setting dialog.

6.10. View Menu



Introduction

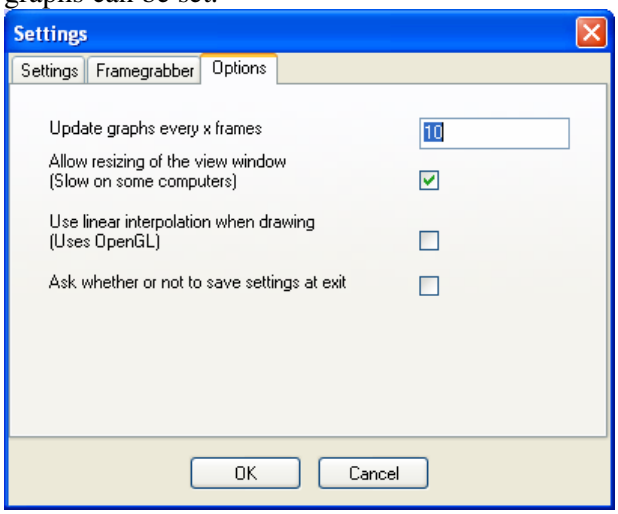
The camera controls window is not a dock window of X-Control. That window will always be displayed by X-Control.

X-Control disposes different dock windows:

- X-View
- Histogram
- Graph
- Time Graph
- Gamma
- Temperature

The display of the histogram, graph and time graph will reduce the frame rate. These mentioned dock windows needs resources for calculation and display. When the image refresh rate is of high importance, it is strongly recommended to switch off those windows because they are quite calculation intensive.

By means of the setting dialog (see file menu of X-Control) the refresh of some graphs can be set.



Update graphs every x frames. This setting has to be set to an unsigned integer. According this setting, following views will be updated

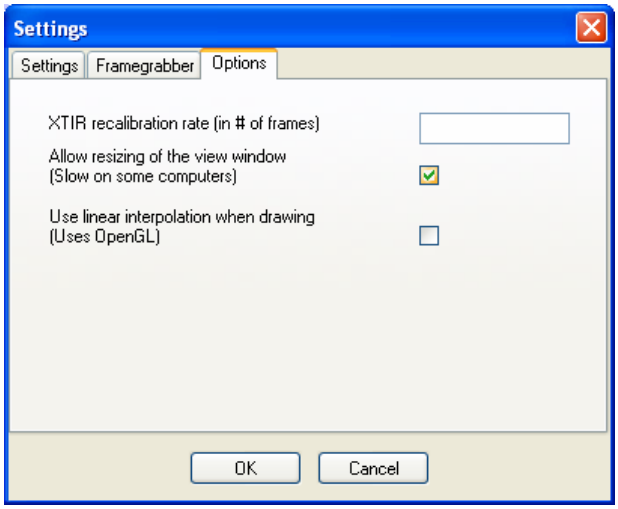
- Histogram
- Graph
- Time Graph

The user can dock and resize all the dock windows. When X-Control is closed, all the dimensions are stored in a file (.\X-Control\Resources\ layout.cfg). This file is loaded at each start up of X-Control.

X-view

Show imaging window on the X-Control main screen.

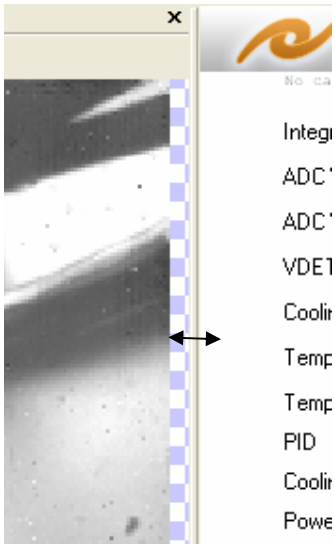
Note that the size of this window can be resized if the option is checked in the setting dialog (option tab).



The behaviour of all windows will be demonstrated by means of the X-View window.

Resize a window

To resize the window, set the mouse on the border of the concerned window.

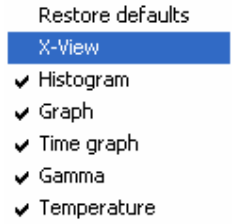


Your mouse cursor will than be represented by arrows. Push the left mouse button and drag the border of the window until the window has the required size. Then release the left mouse button.

Close a window

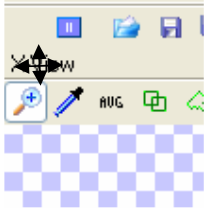
Push the X on top of the window. This toggle the display of the concerned window to off.

Open a window

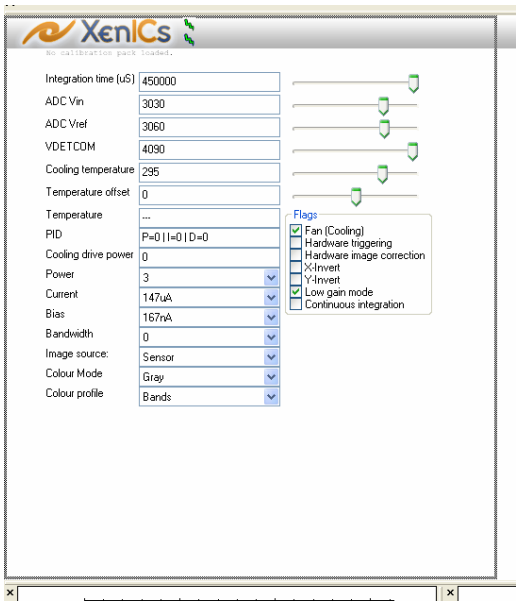


All the checked windows in the View menu of X-Control are visible. In this case, the X-View imaging window is not visible. To make it visible, check the concerned window in the View menu of the X-Control application by clicking it by means of a left mouse click.

Drag a a window



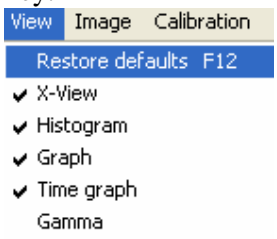
Position your mouse on the name of the concerned window you want to drag. The mouse cursor will be represented by means of 2 orthogonal double arrows.
Keep pushing the left mouse button down. During that action you can drag the window. Release the left mouse button if you want stop dragging the concerned window.



During the dragging action, the future window position and size is indicated by means of dotted lines.

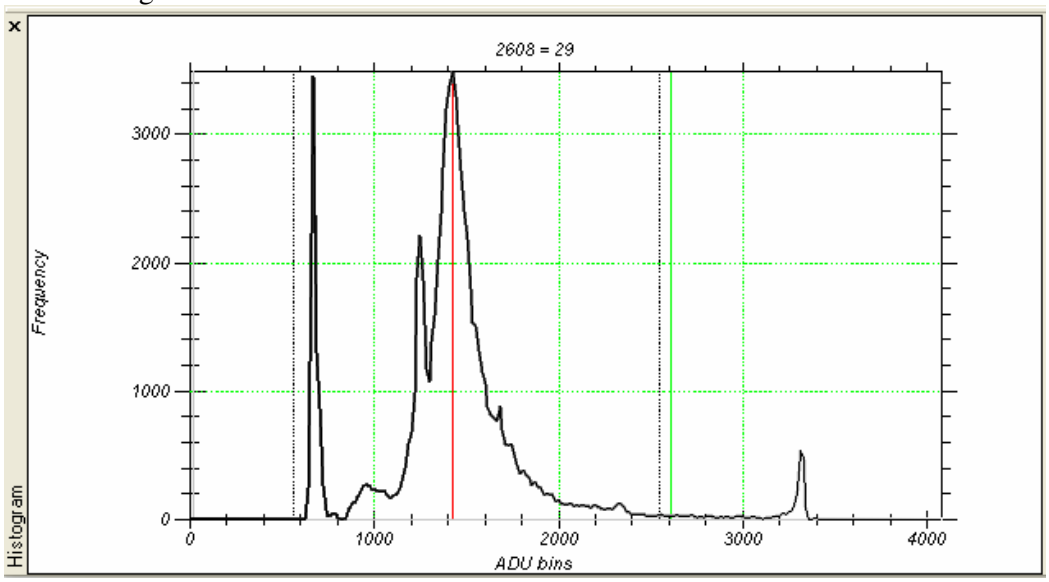
Note that the different windows have dock properties. When a window is dock window, it floats on top of the main X-Control application window, or it snaps to a side of the main X-Control application window.

Restore defaults
To restore the factory defaults of all dock windows, give a left mouse click on the concerned menu of X-Control.
The same action to restore the defaults can be obtained by pushing the F12 shortcut key.



X-Control will load the configuration stored in the standard configuration file (.\X-Control\Resources\std_layout.cfg).

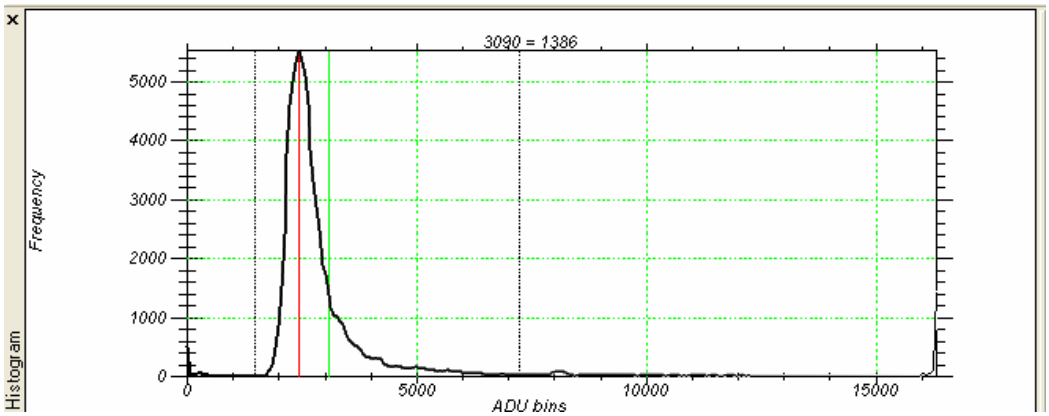
Histogram
Show histogram on the X-Control main screen.



Peak
The peak value of the histogram is indicated by means of the red line.

ADU frequency
The section of the histogram by means of the green vertical line is represented on top of the histogram. So for the ADU value of 2600, there are 29 pixels detected in the histogram.

The green line can be dragged in the histogram, to get the read out of different ADU values. You can drag the green line. Point the mouse pointer in top of the green line. Push the left mouse button. Keep the left mouse button pushed and drag the green line to the required ADU value in the histogram. Then release the left mouse button.

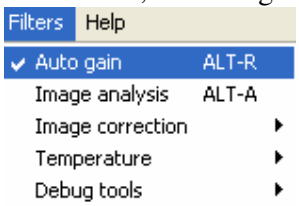


The number of pixels in ADU value 3000 is now 1386.

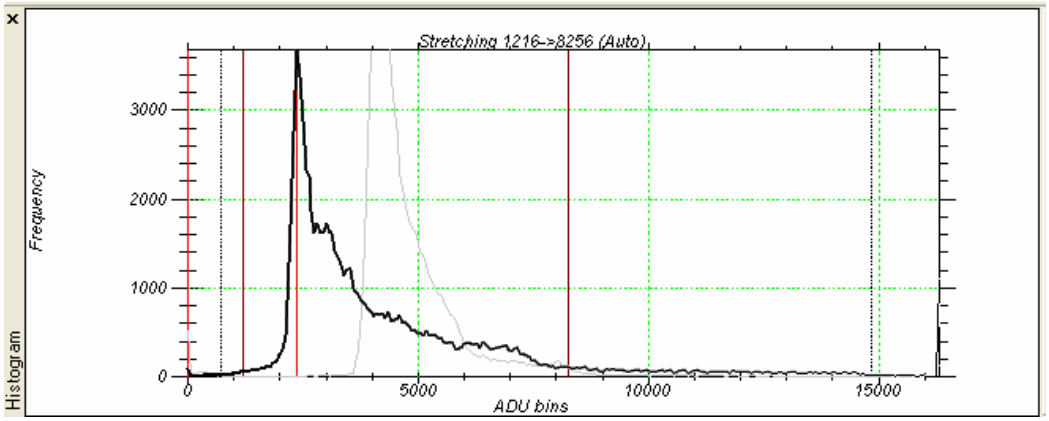
The histogram displays also the ADU values before and after pixel correction.

Shape before and after correction

In this case, the auto gain filter correction was selected.



The corresponding histogram is:



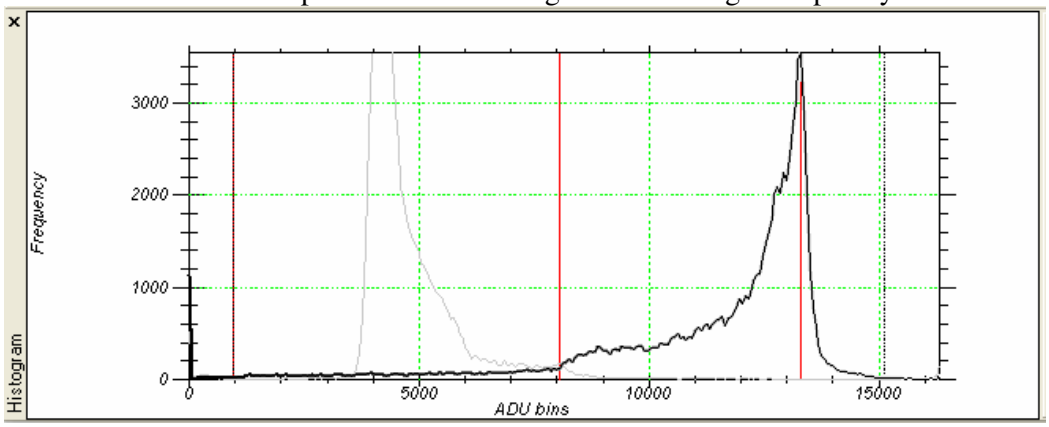
The gray histogram is the histogram of the raw pixel values. The histogram represented in black, are the corrected pixel values.

Stretching values, auto gain

A special feature for the auto gain mode is that the user can set the stretch points. The histogram will be stretched according these set values.

The stretching ADU values are represented in a dark red colour in the histogram. Those lines can be dragged in the histogram. To drag these lines, select a line with the mouse pointer. Keep pushing the left mouse pointer and drag the line. If the line is set at the required place, release the left mouse button.

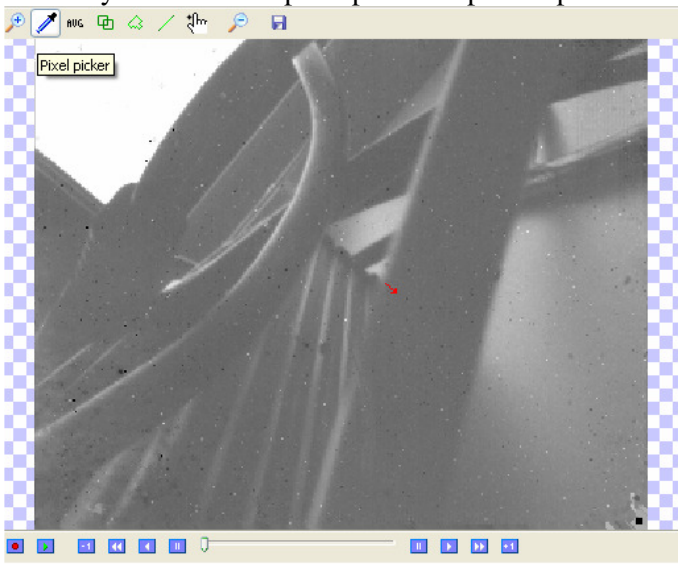
You will see that the shape of the black histogram will change completely.



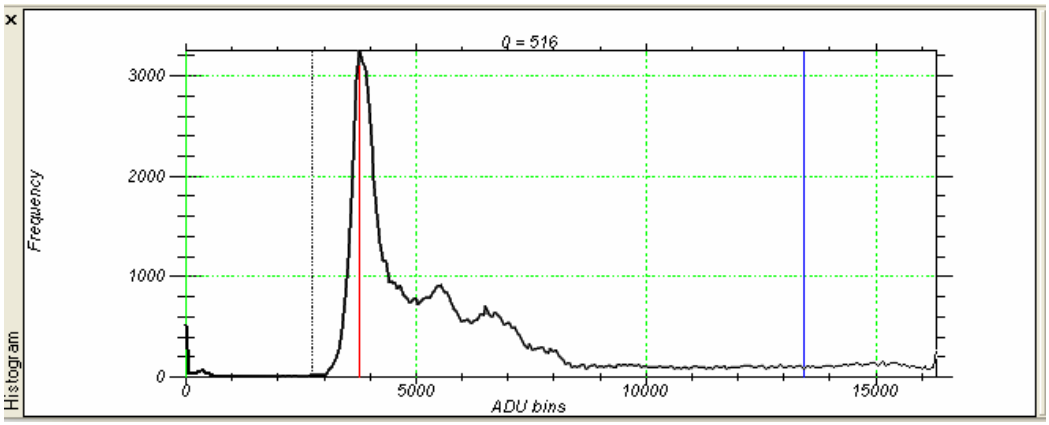
To deselect this stretching values, and to return to the default stretching values, give a left mouse click outside of the histogram graph, but in the histogram view window.

Pixel picker

Select by means of the pixel picker a specific pixel in the X-View imaging window.



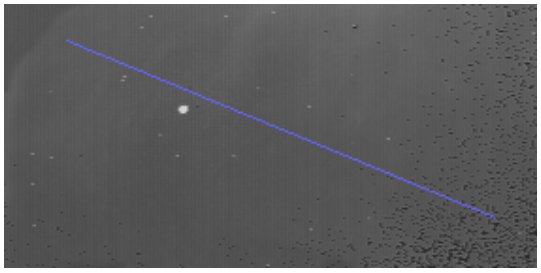
The ADU value of the selected pixel in the X-View imaging window will be displayed by means of a blue line.



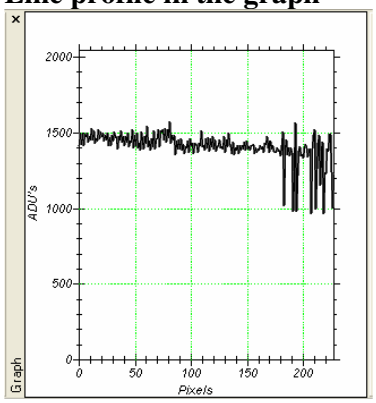
Graph

Show graph on the X-Control main screen. A graph can be used to plot the intensity along a line or on the X-View window or to average the intensity on a certain an indicated surface in X-View.

A line can be drawn with X-Tool.



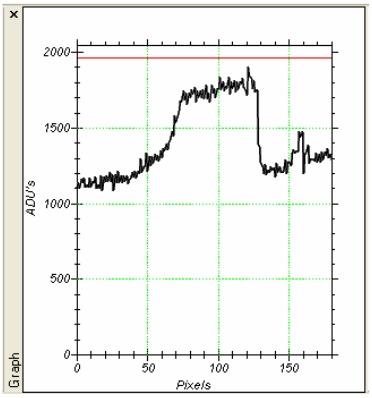
Line profile in the graph



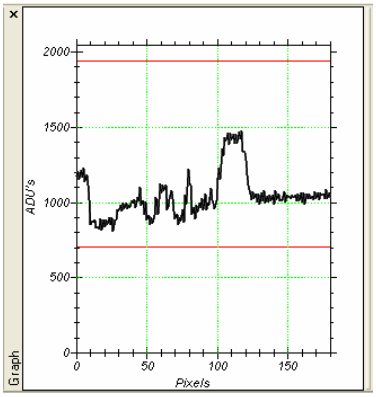
The line graph is displayed.

The scale of the graph can be adjusted. Give a left mouse click in the graph and keep your left mouse button down. A red line will appear.

Scale a line profile in the graph



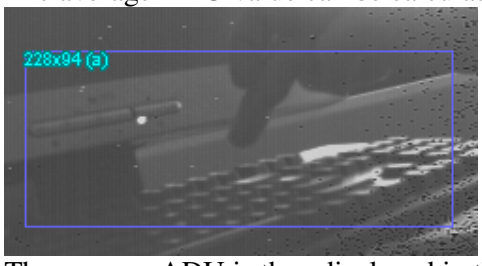
Keep your left mouse button down and drag the red line to a certain second level.
Release the left mouse button.



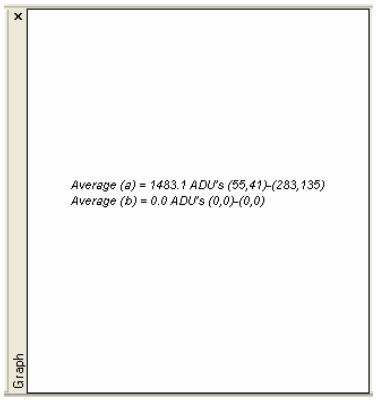
You will see that the graph is zoomed to the desired width or height.

Rescale a line profile in the graph
To zoom out (to the original state and size of the graph) give it a right mouse click.

Average the values in a surface in the graph
The average ADU value can be calculated of an indicated surface in XView.



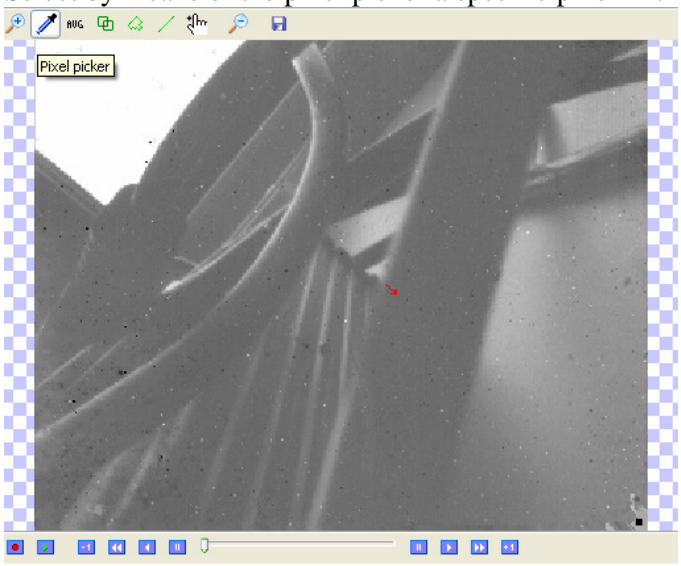
The average ADU is than displayed in the graph pane.



The surface can also be calculated in a polygon (see tools).

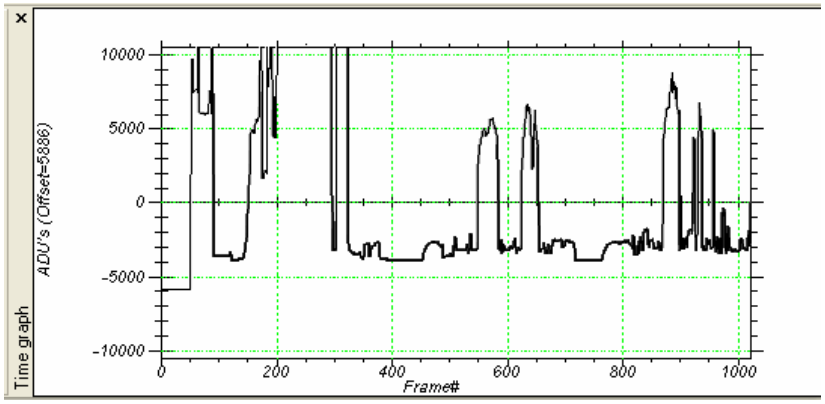
Time graph

Select by means of the pixel picker a specific pixel in the X-View imaging window.

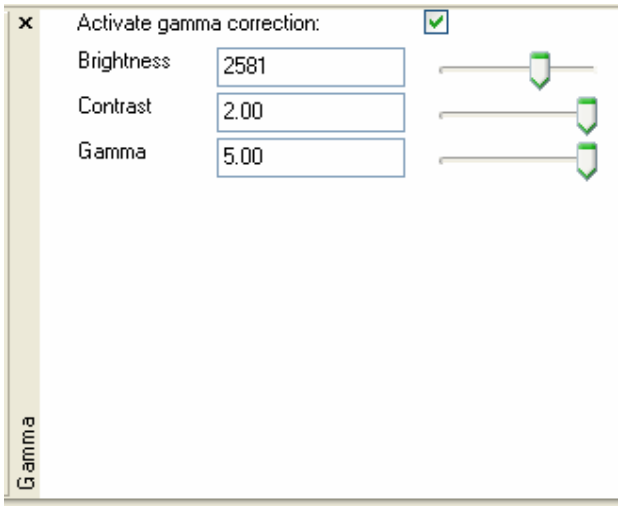


The selected pixel is indicated by means of a red arrow in the X-View imaging display.

The time graph on the X-Control main screen shows the intensity of a pixel in a time domain.



Gamma
Shows the gamma correction panel.



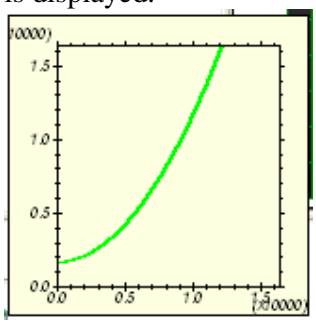
This window allows an additional gamma correction of the image.

Brightness
It is the perception elicited by the luminance of a target in an image. The brightness is set by means of an offset in the software. The brightness control can be seen as control to changes the amount of white in all pixels.

Contrast
It is the difference in visual properties that makes an object distinguishable from other objects and the background in an image. The contrast is set as multiplier in the software. The contrast control can be seen as control to changes the difference between adjacent shades of gray.

Gamma
Gamma correction is the name of an internal adjustment applied to compensate for non linearities in imaging systems. Non linear devices have a transfer function that is approximated fairly well by a single type of mathematical function: a power function. Gamma is applied as exponent in the following power function:
Result = contrast * pow(Gamma) + brightness

By setting the brightness, contrast and gamma, the shape of the transformation curve is displayed.



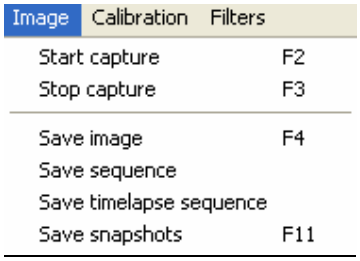
The gamma correction is useful to pronounce the contrast and brightness of images that are not well pronounced. The transformation curve allows the user to optimize the characteristics of the X-View imaging window. The horizontal axis represents the intensity in values, and the vertical axis displays the intensity out values. The intensity in and intensity out values are active part of used for intensity correction.

The gamma control can be seen as a control to change the contrast in the dark areas of the image.

Temperature

This item shows the temperature mapping panel. (Only relevant for XMID XEVA cameras with temperature calibration, please contact your sales representative)

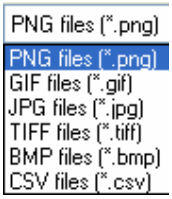
6.10. Image Menu



Start Capture
Starts capturing images. (see also in the icon menu)

Stop Capture
Stops capturing images (see also in the icon menu)

Save Image
Allows the user to save an image in different formats:



PNG: Portable Network Graphics
GIF: Graphics Interchange Format
JPG: Joint Photographic Experts Group
TIFF: Tagged Image File Format
BMP: Bitmap
CSV: Comma Separated Values

(see also in the icon menu)

Save Sequence
This allows the user to save a sequence of images. Use the same menu to stop the saving of consecutive images (see also in the icon menu)

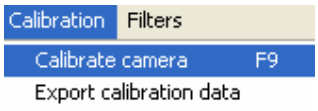
Save Timelapse sequence
This allows the user to save a time lapse images. Use the same menu to stop the saving of time lapse images (see also in the icon menu).

Save snapshots
This allows the user to save different images. The images are saved if the user pushes save snapshot menu (see also in the icon menu).

6.10. Calibration Menu

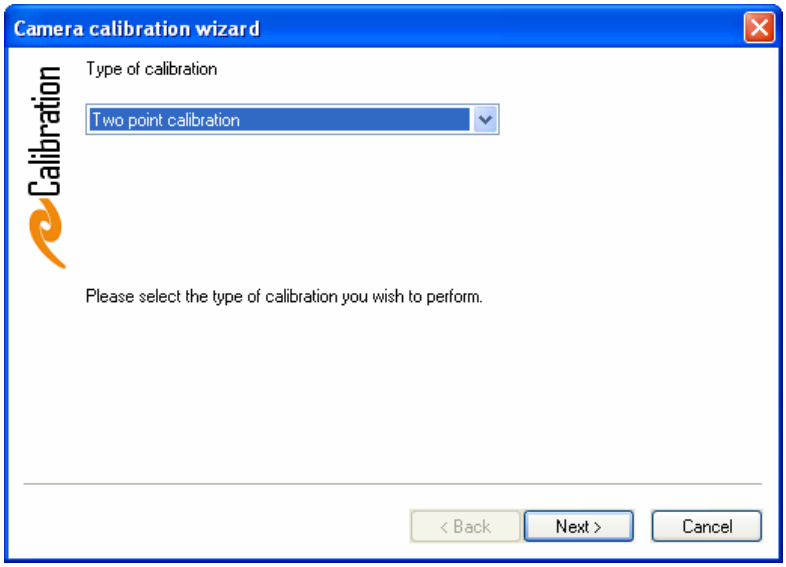
The aim of the non-uniformity correction is to detect the bad pixels in an image. These pixels will be replaced by neighboring pixels. Moreover, a gain and offset correction will be performed.

Calibration Camera



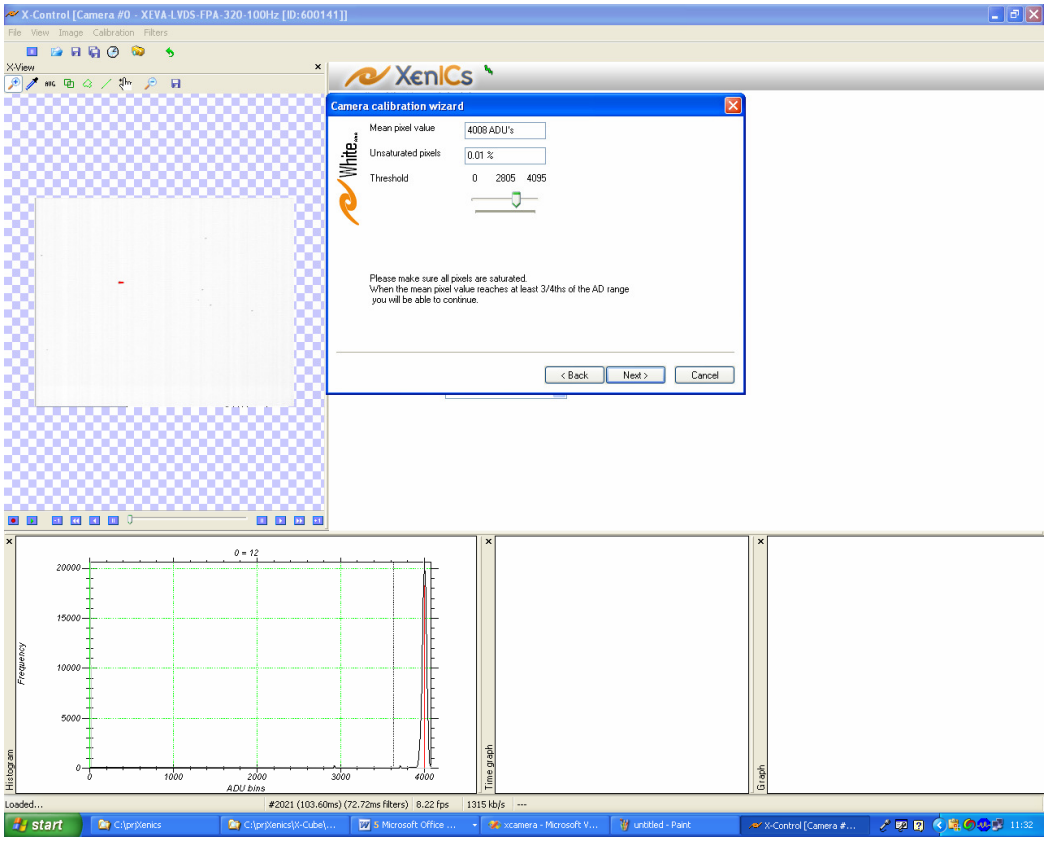
Two Point correction

Select “Calibrate camera” in the X-Control main screen. A wizard will guide the user through the calibration procedure. You will find the description of the calibration procedure step by step. The calibration is based on acquiring a set of three image sequences (saturated, dark and grey image).



Analysis of a saturated image

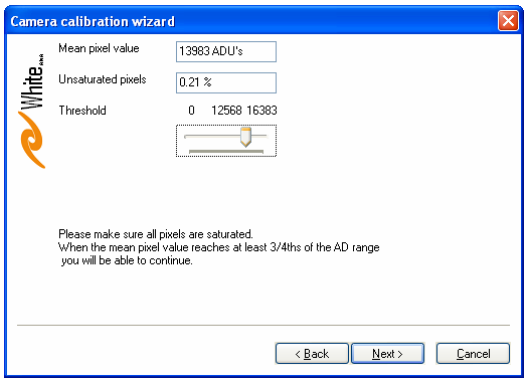
To obtain a white or saturated image with a XMID camera, point the camera to a hot object. To obtain a white or saturated image with another camera, take the lens from the camera and face the camera to natural light.



Prerequisite is a saturated image. Inspect the histogram and the peak of the histogram should be around the maximal pixel value. In this case, it is a 12 bit camera (maximum around 4095).

Analysis performed: Threshold using a user defined value.

The bad pixels will be detected first of all in a saturated image. Pixels with a too low ADU value will be rejected. The rejection limit value can be set by means of a slider. The rejected pixels will be red (see picture above). Use the histogram view to control the saturation of the image.



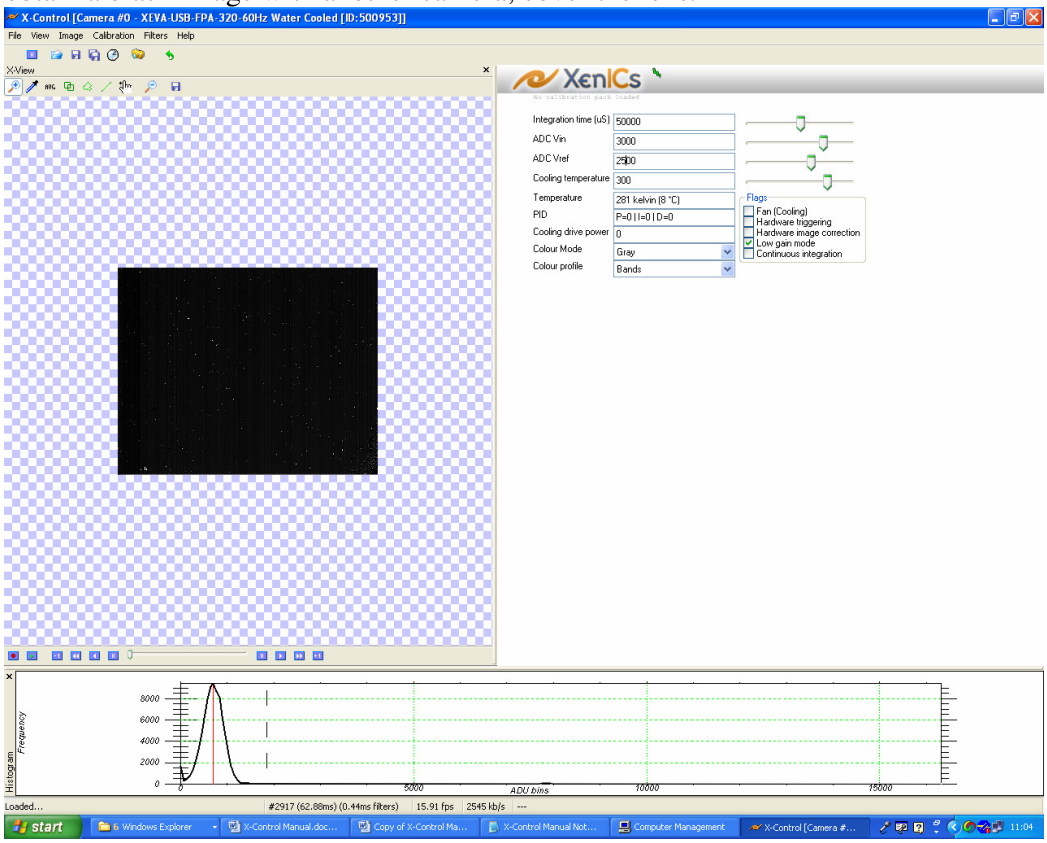
Adapt the threshold slider from low to high, trying not to disqualify too many pixels, just the ones which are black or dark grey when the slider is at 0.

The result of the analysis can be found in files in the data subdirectory of the X-control application.

1. whiteimage.png
   (A copy of the image used to calc. the bad pixels for reference)
2. rej1_unsaturated.png
   (A bitmap in which the bad pixels are marked in red)
3. whiteimage.xcf
   (A copy of the camera settings used to perform this analysis)

Analysis of dark images

To obtain a black image with a XMID camera, you have to point to a cold object. To obtain a black image with another camera, cover the lens.

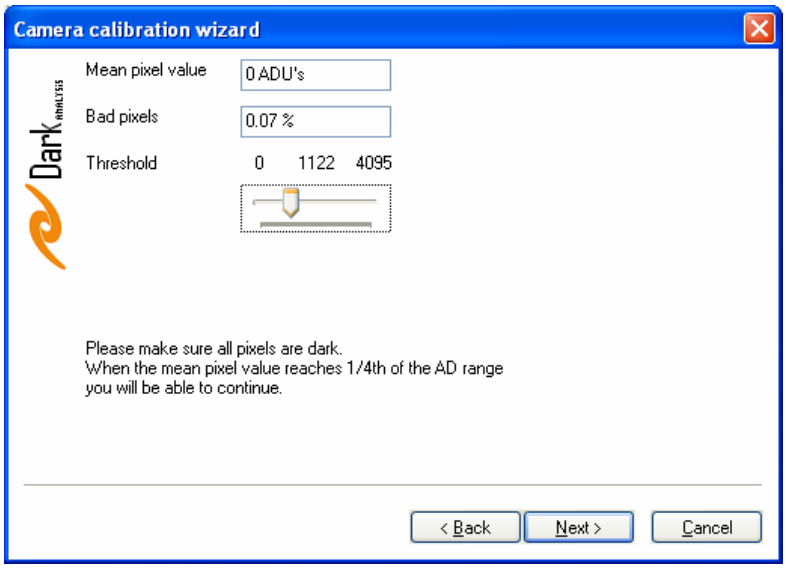


Prerequisite: A darkened image. The main value in the histogram should be near ADU value of 0, so that the fixed pattern noise is visible in the histogram!

Analysis performed:
Standard deviation over different frames
    Reject pixels deviating more than twice the median std. dev.
Calculating the dark average over different frames (required for std. dev.)
    Reject pixels exceeding the dark threshold level.

The bad pixels will be detected on dark images by means of a statistical analysis. Pixels with too high ADU value will be rejected. The threshold value can be set by means of the slider.

Bad pixels (with a too high ADU value) will be shown in red. Noisy pixels (too high deviation) are also detected (and rejected) by comparing the ADU values of number of captured images.



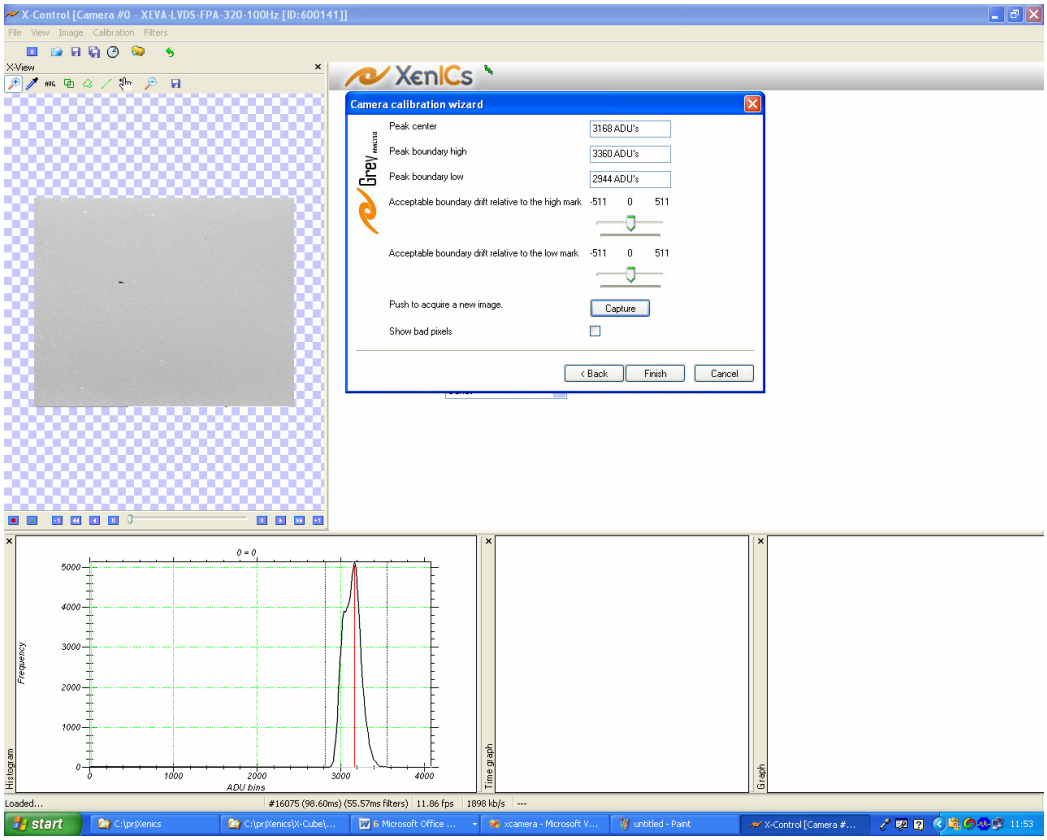
Adapt the threshold slider to remove the most, but not all deviations in the dark image. A good bad pixel rating in this stage would be below 0.9% of the total sensor.

The result of the analysis can be found in files in the data subdirectory of the X-control application.

4. darkimage.png
   (A copy of the last image captured during dark analysis)
5. rej2_noisy.png
   Red pixels – Pixels deviating more than twice the std. dev.
   Yellow pixels – Pixels exceeding the dark tresh.
6. darkimage.xcf
   (A copy of the camera settings used to perform this analysis)
7. deviatonmap.png
   (A bitmap containing the standard deviation in the *red* channel)
8. rej2_average.csv
   The dark average per pixel in CSV format.
9. rej2_deviation.csv
   The standard deviation per pixel in CSV format.

Analysis of Grey images

To obtain a grey image with an XMID camera, you have to point the camera to an object of an intermediate temperature. To obtain a grey image with another camera, take of the lens and set the camera in front of an object. The closer you put the camera to the object, the darker the image.



Prerequisite:

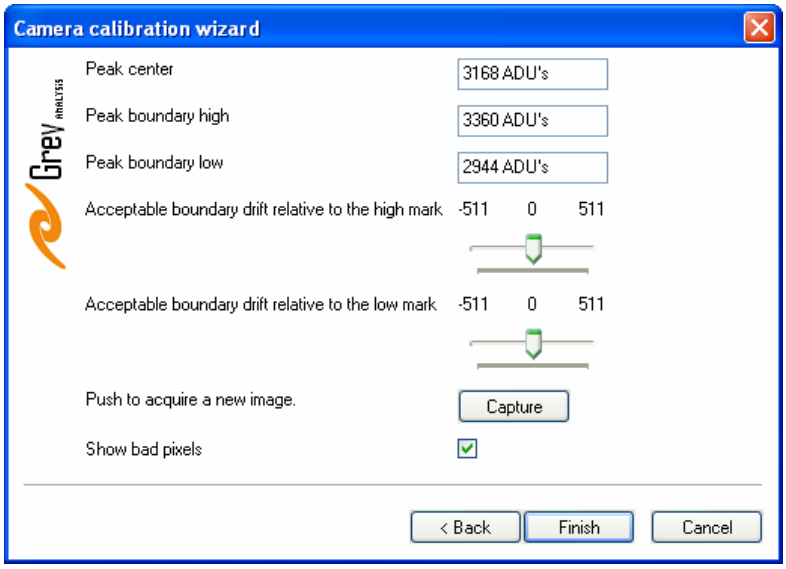
1. A grey level image with a histogram peak at around 3/4^{ths} of the maximum ADU value (in this case 3000).
2. Preferably a sharp peak (minimize light gradients).

Analysis performed:

1. Acceptance trigger on 3/4th of the maximum ADU value. (The filter will wait until an acceptable grey level is reached)
2. Peak detection.
    a. Distill the threshold values of the grey spike
    b. Distill the center of gravity
3. Pixels exceeding 20% off the threshold values calculated by the peak detector will be marked as bad.
4. The gain factors are calculated as follows: (GreyPixelValue)-(DarkAverage)

The aim of this analysis is to calculate a gain factor for each pixel. To calculate the gain factor per pixel, the algorithm uses the average ADU values of the dark images analysis and the ADU values of the grey image.

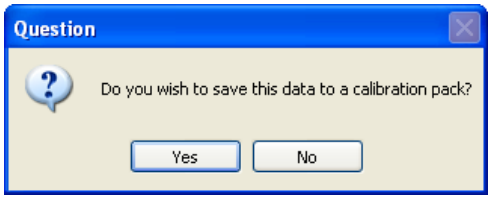
Make the sure the peak center is around 3/4th of the ADU maximum value for this grey image calibration.



The result of the analysis can be found in files in the data subdirectory of the X-control application.

1. rej3_greylevel.csv
   (The high threshold value of the grey peak)
2. rej3_gainfactors.csv
   (The gain factors)
3. rej1_unsaturated.png
   (Updated with bad pixels as described in Analysis step 2)
4. greyimage.png
5. greyimage.xcf

Save calibration pack

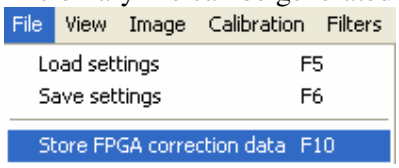


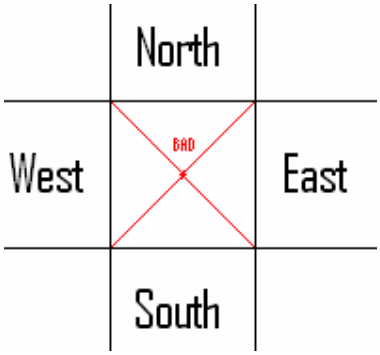
If the calibration pack is stored, the filename will be extended with the unique camera number.

Remark
It is not the aim to replace all the pixels of the image. It is important to evaluate the result of bad pixels as shown in the dialogs. If too much pixels are to be replaced, there is no stability of the image. So the set of minimum and maximum pixel values is important. A visualization of the correction files is as well important to get a view of the replaced pixels (see also Show the bad pixels).

A calibration pack is in fact a zip file. It contains the required images (to execute the pixel replacement) and setting file (settings applied during the calibration proces).

Binary file for static hardware pixel replacement
The binary file can be generated from the correction data.





After a 2 point image correction, the program can generate FPGA correction data.

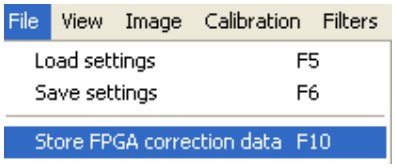
1. Writes multiplier based on a reduced value of the full gain factor used in the software correction algorithm.
2. Writes offsets based on the dark current values.
3. Calculates which neighboring pixel to use for replacement in the following fashion:
    a. Calculate the average of the good neighborhood pixels.
    b. Find the neighborhood pixel closest to the calculated average.
    c. Mark this pixel as the replacement source using the flags you see in Figure 9.

The calculation of the corrected pixel value is shown below:
corrected pixel value = ((raw pixel value * multiplier)/1024) - offset

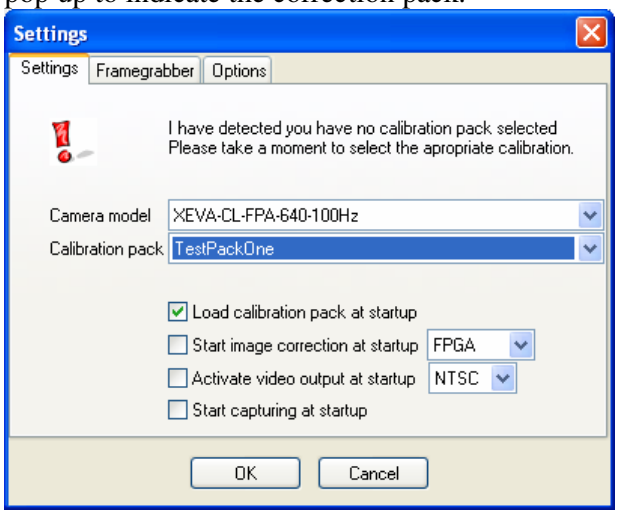
The stream of 32 bits correction data can only be loaded to a camera with a 9808 read out chip (not possible with a camera with a 9702). The FPGA of the camera will replace statically the pixels according the information in the binary file.

A binary correction file can be generated from the correction data. To generate this file, select the FPA correction data

or select the Store FPGA correction data of the file menu panel.

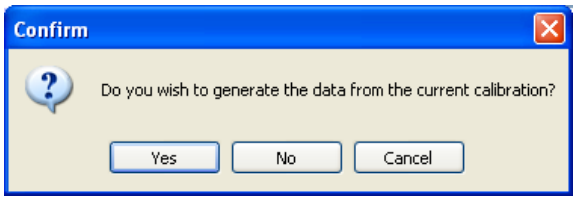


In the first case, if the FPGA Pixel correction flag is chosen, the setting dialog will pop up to indicate the correction pack.



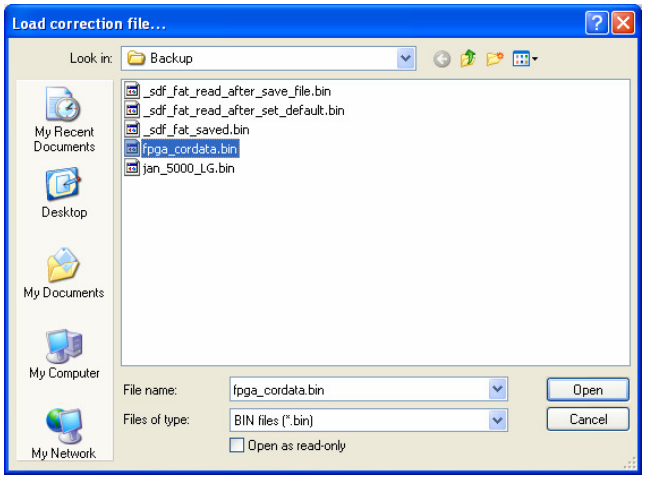
From this correction pack, the binary correction file will be generated.

In the latest case, if the user chooses the store FPGA correction data of the file menu panel, the user has the ability to upload the binary correction data from the calibration pack or she/he can upload a correction file made by means of another application.



Push yes in case you want to generate a binary correction file from the loaded calibration pack.

Push no if you want to browse to a specific binary correction file on disk of your PC. In this case, the concerned open file dialog is shown.



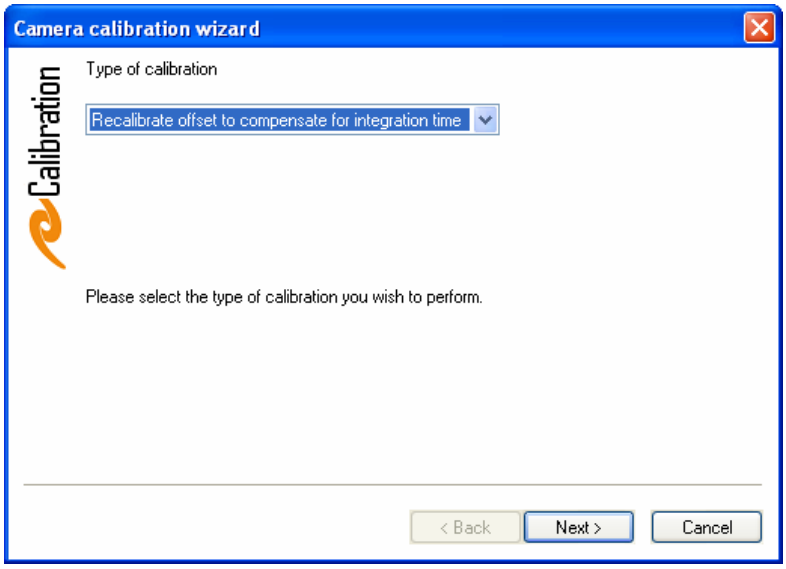
When all the data is uploaded to the FPGA of the camera, the static hardware pixel replacement is done on the FPGA of the concerned camera.

Note that if a reduced window of interest is set by means of the tool menu, only the concerned correction data of the selected window will be uploaded to the FPGA.

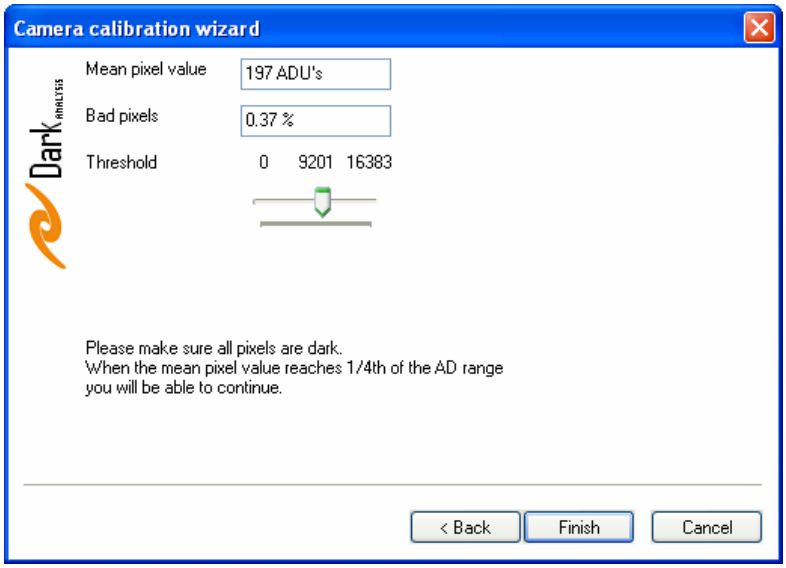
Recalibrate offset

If an existing calibration pack is loaded, it can be compensated to use it with another integration time.

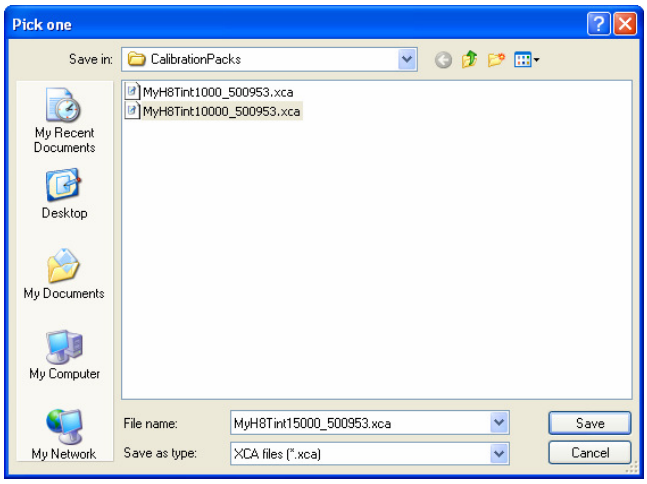
Set the required new integration time. Switch of any all means of image correction and start up the calibration wizard.


Camera calibration wizard
Calibration
Type of calibration
Recalibrate offset to compensate for integration time
Please select the type of calibration you wish to perform.
< Back
Next >
Cancel

The white and gray analysis will remain the same (as well as the gain factors), but only the dark analysis will be changed.



After this analysis, the user can save the new calibration pack.



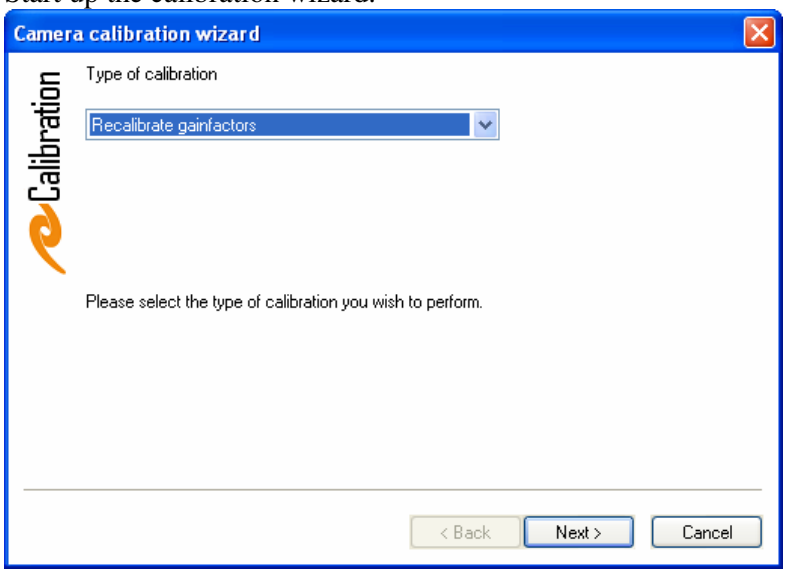
Recalibrate gain factors

It can be possible that the generated calibration pack with recalibrate offset has to be compensated for the gain. The recalibration of the offset will allow the user only to compensate the integration time within certain limits. Once those limits are exceeded, the gain must be also corrected.

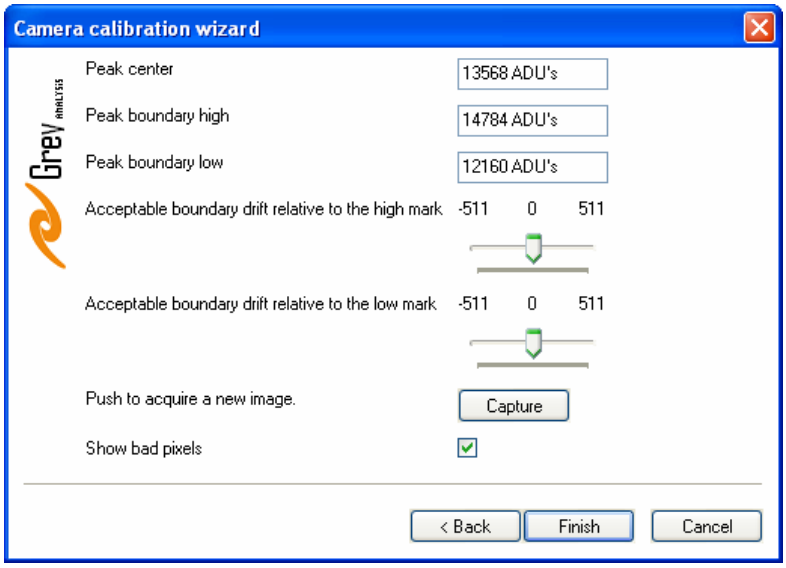
If an existing calibration pack is loaded, the gain can be compensated to obtain a better corrected image.

Do not change the settings of the loaded calibration pack. Disable all means of image correction and start up the calibration wizard.

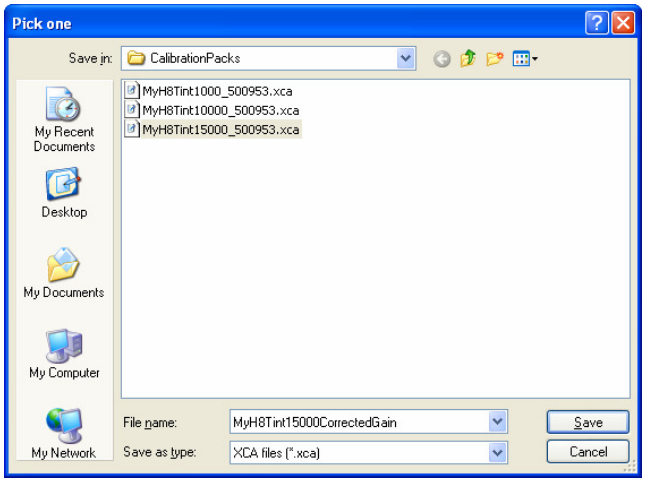
Start up the calibration wizard.



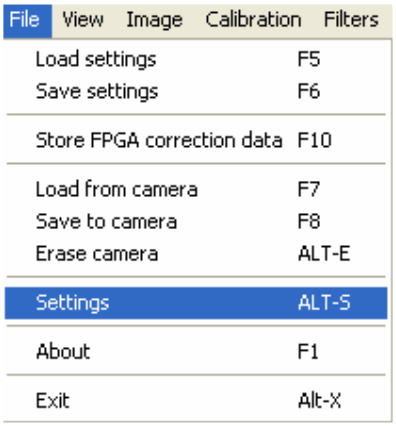
Now, only the gray analysis will be done (as well as replacement of the gain factors).



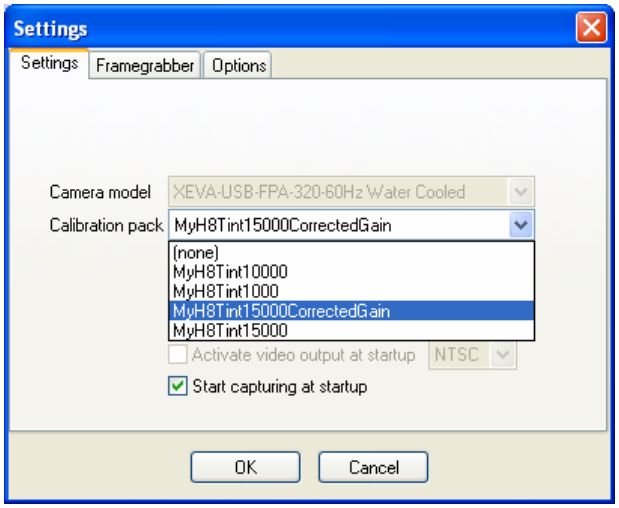
After execution, the compensated calibrationpack can be stored.



Load a calibrationpack



A calibrationpack can be loaded via the setting dialog. The selected calibrationpack will also be loaded at startup of X-Control. All settings from the calibrationpack will be applied on the camera.



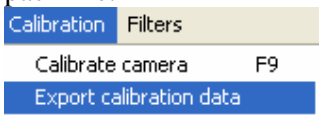
The name of the actual loaded calibration pack is displayed on top of the control pane in X-Control.

Note that only the calibration packs can be loaded in the camera if the unique identifier in the EEPROM of the camera corresponds with the identifier at the end of the filename of the calibration pack. If this is not the case the calibration pack can not be loaded by the X-Control software. In addition, the calibration pack can also only be loaded if the actual camera type (stored in the EEPROM of the camera by means of a product identifier) is equal to the camera type applied to save the calibration pack. This is because different TTB's affect the resulting image coming from the camera.

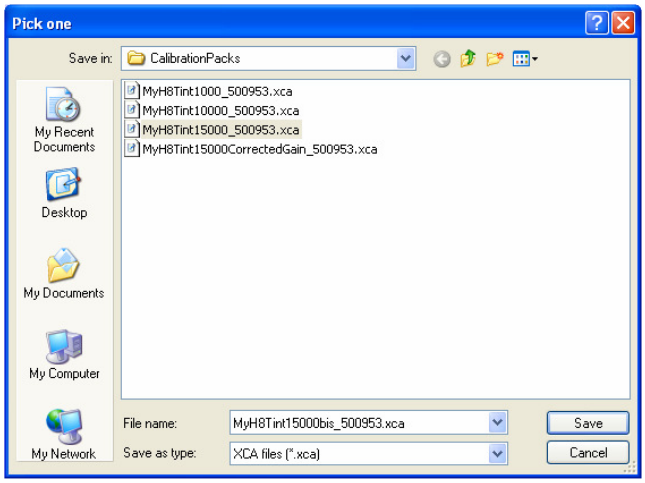
If the concerned calibration pack does not correspond to these 2 criteria, the calibration pack will not be loaded. A corresponding message will be shown in the controls pain of the X-Control application (Invalid calibration).

Export a calibration pack

Creates a calibration pack (xca file) from an active calibration, such that it can be reused in later instances. The loaded calibration data can be exported to a calibration pack file.



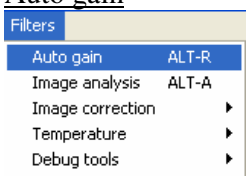
Give the file a name.



A file with xca as file extension will be generated in the CalibrationPacks subdirectory.

6.10. Filters Menu

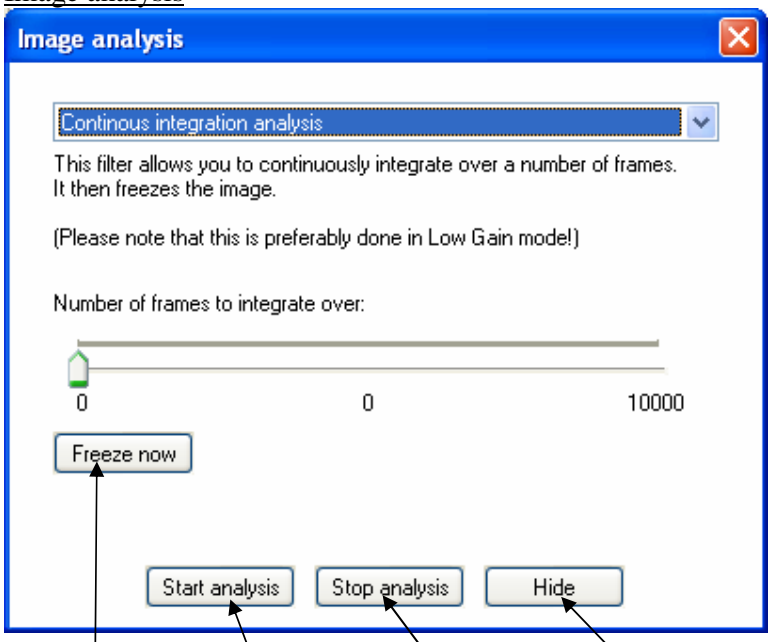
Auto gain



An algorithm that will stretch the available data in the image over the sensor bit size. (Effectively increasing brightness and contrast automatically in low light level situations).

The auto gain stretching values can be adjusted by means of the histogram (see histogram topic in this manual).

Image analysis



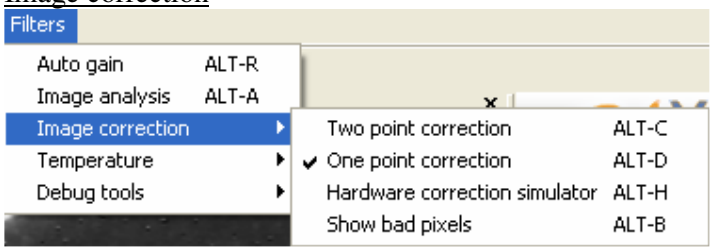
Stops continuous integration immediately, and displays the frame count in the slider above.

Start continuous integration.

Stop the analysis (unfreeze image, and display sensor image again)

Hide the analysis window

Image correction



Two Point correction
With the result of the 3 analysis, the camera replaces the pixels dynamically.
Not used in combination with an XPORT camera!

One Point correction
A one point correction deducts from the actual image the stored dark image from the selected calibration pack.
Not used in combination with an XPORT camera!

Hardware correction simulator
A binary correction file will be uploaded in the software. The pixel correction will be done in the software by means of the binary correction data file (.\X-Control\Data\ fpga_cordata.bin).

Show bad pixels
If this option is enabled, the pixels displayed in a red color will be replaced from are the pixels to be replaced from the dark analysis and the saturated analysis.

Temperature
Can only be used when an XMID XEVA camera is precalibrated for temperature conversion at Xenics.
Not used in combination with an XPORT camera!

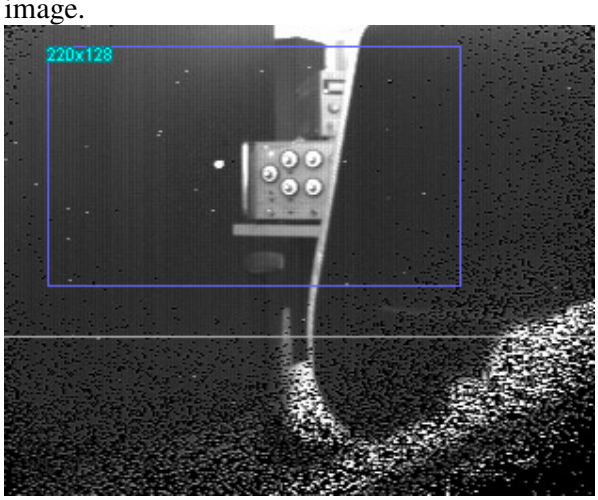
Debug tools
Not used in combination with an XPORT camera!

XTIR (XPORT)
Use automatic FPN calibration in order to remove the Fixed Pattern Noise (FPN) or dark signal non-uniformity.

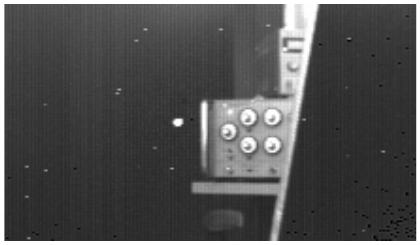
10. Tools

Zoom in

If the button is selected, a window of interest can be selected by drawing a rectangle in the image display.
Click zoom button, point the mouse in the X-View image display and push the left mouse button down. Keep the left mouse button down and drag a rectangle in the image.



When the left mouse button is released the new window of interest is set.



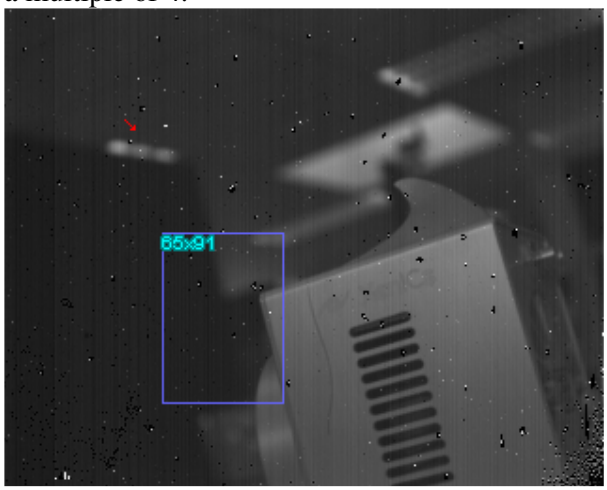
This is also displayed in the status bar of the X-Control application.

WOI = (0,0)-(32IWOI = (24,14)-(244,142) (220x128): right click to restore full size

Right click to return to full window of interest or use Zoom out button

If a reduced window of interest is selected, the frame rate will go up.

The window of interest:
The dimensions of the obtained window of interest that is set in the camera is always a multiple of 4.



The obtained window of interest is:

WOI = (80,112)-(144,192) (64x80): right click to restore full size

If the corresponding settings are saved in the initialization file, you will see following values:
g_dwXStart=80
g_dwYStart=112
g_dwXEnd=143
g_dwYEnd=191

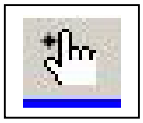
A full window of interest for a 320 x 256 camera (see values in the initialization file (xcf)):
g_dwXStart=0
g_dwYStart=0
g_dwXEnd=319
g_dwYEnd=255

Definition of window of interest. For full frame imaging mode
Xstart=0, Xend=319, Ystart=0 and Yend=255.
Xend >Xstart and Yend>Ystart.
[Xend – Xstart] and [Yend – Ystart] shall be multiples of 4 (depends of the camera model).

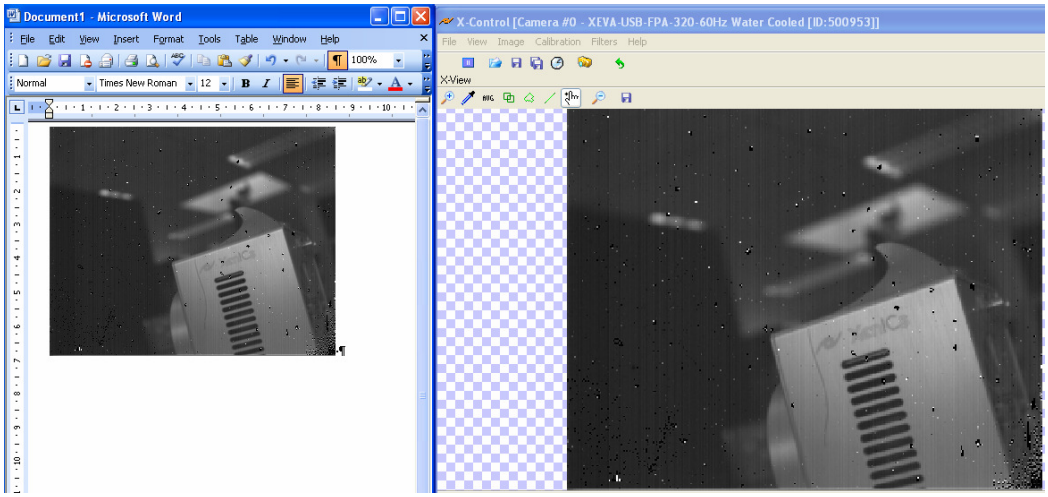
Zoom out

If the button is selected after having zoomed in, the camera will return to the full size window of interest. So click and wait to zoom out to full image. The frame rate increases with smaller windows of interest.

Drag drop image

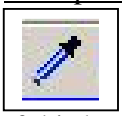


Drag and drop a window (X-View, graph, …) from the X-Control main screen to another application (Word, PowerPoint, …).

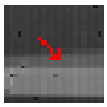

Document1 - Microsoft Word
File Edit View Insert Format Tools Table Window Help
X-Control [Camera #0 - XEVA-USB-FPA-320-60Hz Water Cooled [ID:500953]]
X-View

Give a left mouse click on the icon .
Place the mouse cursor in the X-View camera image. Push the left mouse button down. Keep the left mouse button down and drag the image to the other application. Release the left mouse button to paste the image.

Pixel picker

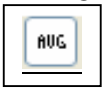


If this button is selected, the intensity (ADU values) of a selected pixel is shown on the time graph and in the histogram (by means of a blue line). The selected pixel is marked by a red arrow.

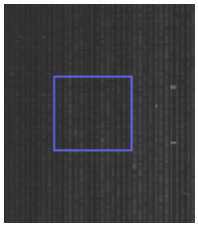


To deselect this pixel, give a right mouse button click in the the X-View camera image.

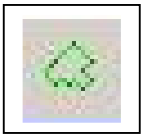
Average ADU value in a rectangle



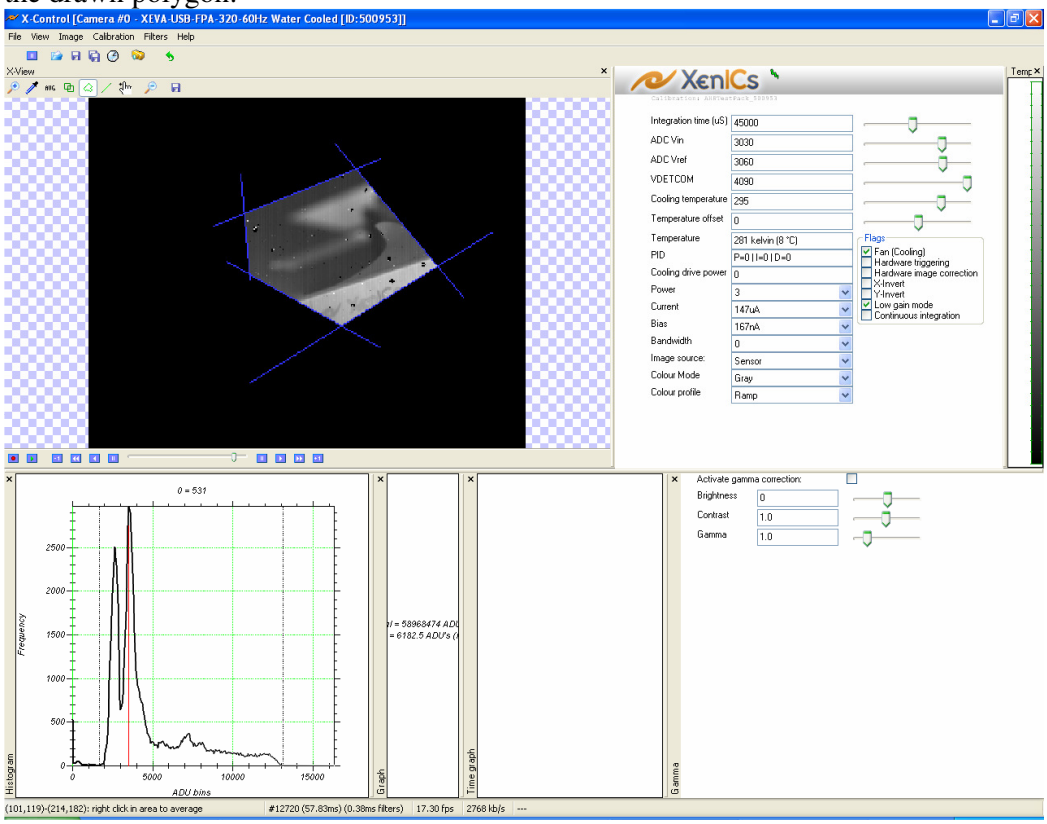
By selecting this button, the average ADU value of a rectangle (selected on X-View imaging window) can be shown on the graph window.



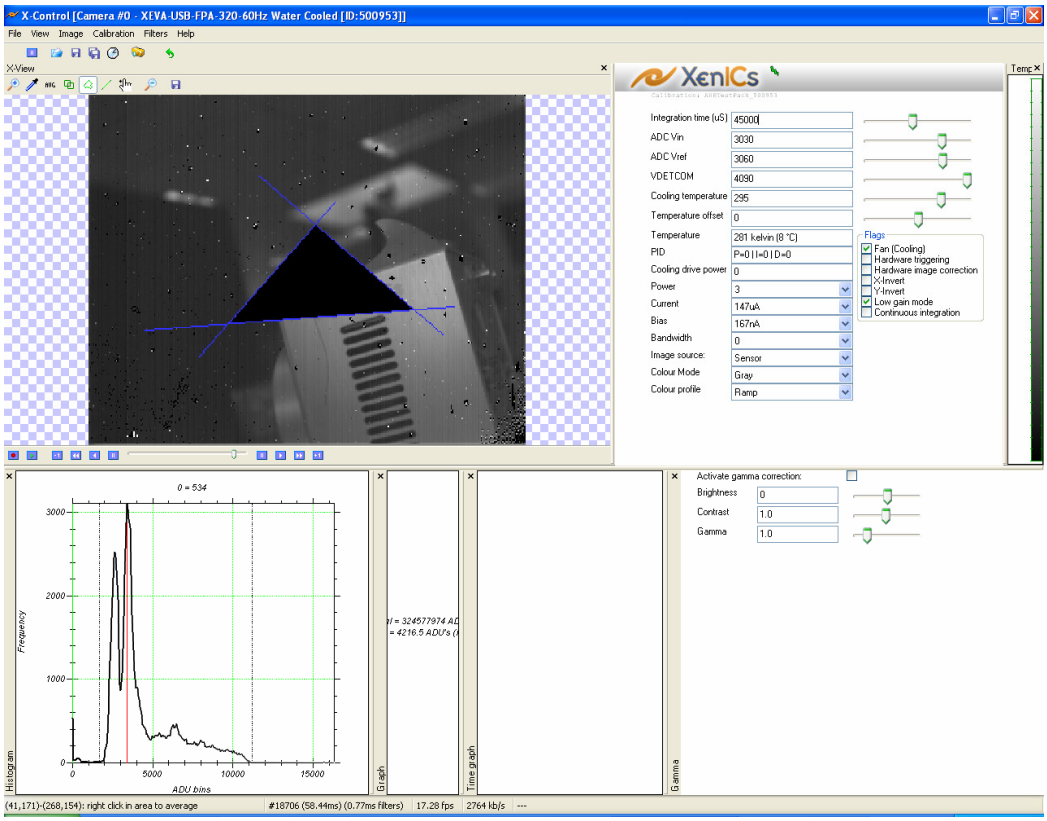
Average ADU value in a polygon



By means of this button, it is possible to display the average ADU value of a selected polygon on the X-View window imaging window. First, draw the lines of the zone to average. Click the left mouse button down and keep the concerned mouse button down to drag the line. Release the left mouse button if the line is drawn. If all lines are drawn, give a right mouse click in the zone you want to average. This can be within the drawn polygon.

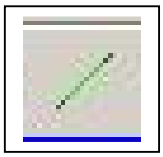


It can also be used to exclude an area.

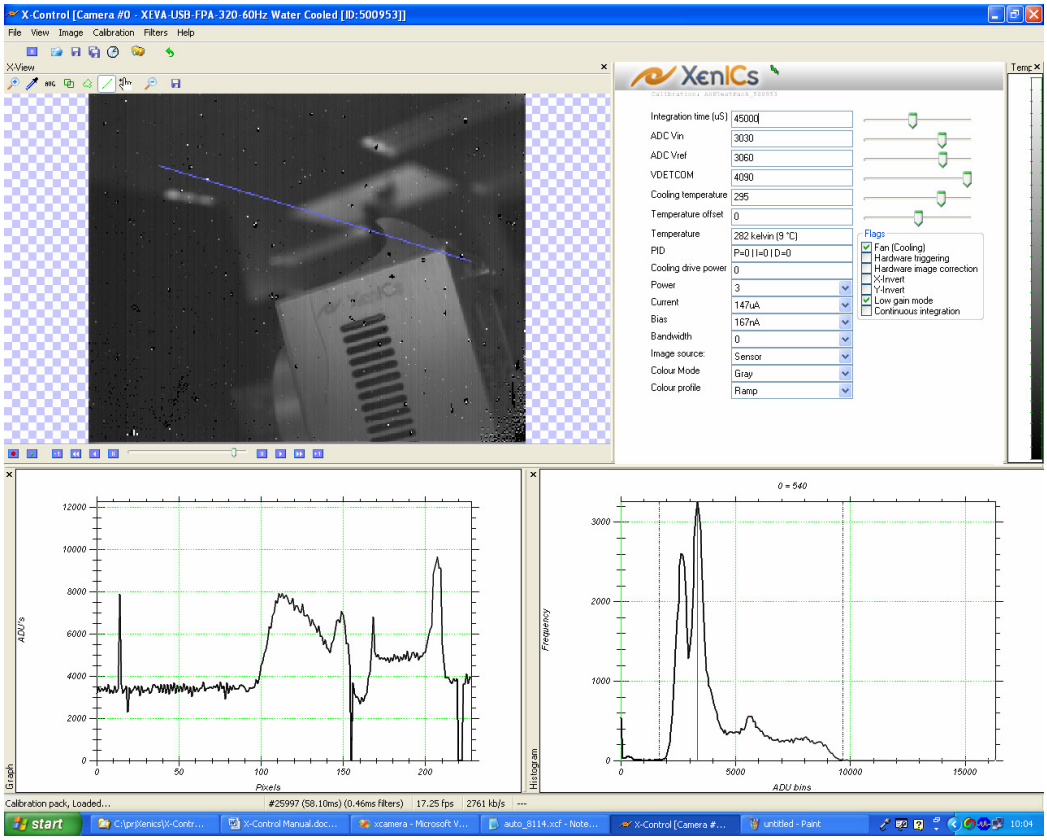


Now the average ADU value is indicated in the graph window.

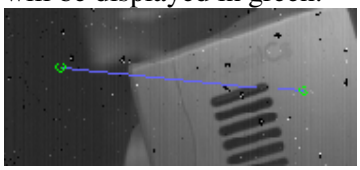
Intensity along a line



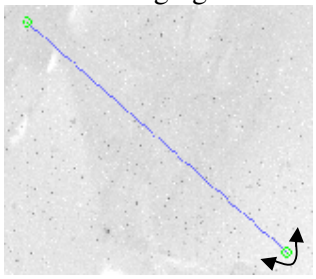
When this button is selected, draw a line in the X-View window. Click the left mouse button down and keep the concerned mouse button down to drag the line. Release the left mouse button if the line is drawn. The intensity (ADU values) along the line are shown in the graph window. To draw a horizontal or vertical line, push and hold ALT and draw the line.



Note that once a line is drawn on screen for a line profile, the line can be moved. To do so, position the mouse on top of one of the ends of the line. The ends of the line will be displayed in green.



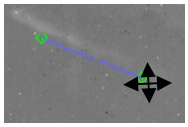
The mouse is on top of one of the ends on the drawn line in the X-View imaging window; push the left mouse button down. Keep concerned mouse button down and drag the end of the line on screen. Release the mouse if the desired line is set on the X-View imaging screen.



It is also possible to translate the drawn profile line on screen.
This is also stated in the status bar of the X-Control application.

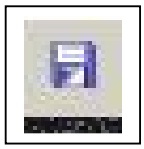
press and hold control to translate.

To translate the drawn profile line in the X-View imaging window, push first the control button. Position than your mouse pointer on one of the ends of the line. Now you will get two 2 orthogonal double arrows, as indicated in following image.



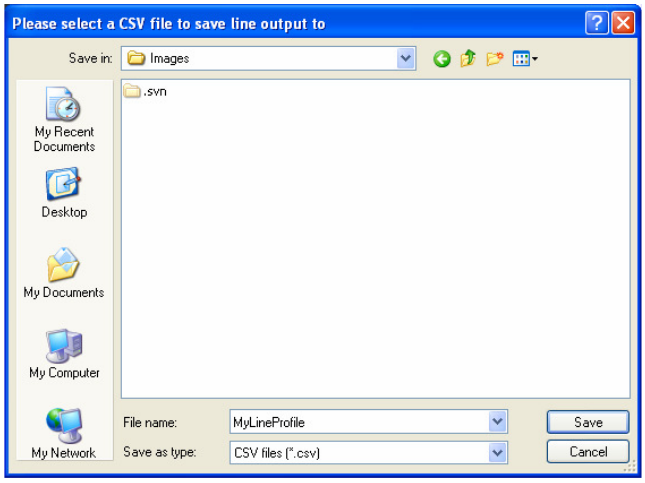
Keep pushing the left mouse button down, as well as the control button on your keyboard, during you move the profile line. If the profile line is in the desired position, release the left mouse button, as well as the control button on your keyboard.

Save line tool output

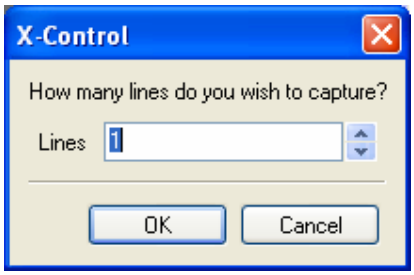


This button will start to save the intensity values of the selected line in a comma separated file.

First the user is asked to enter a file name.

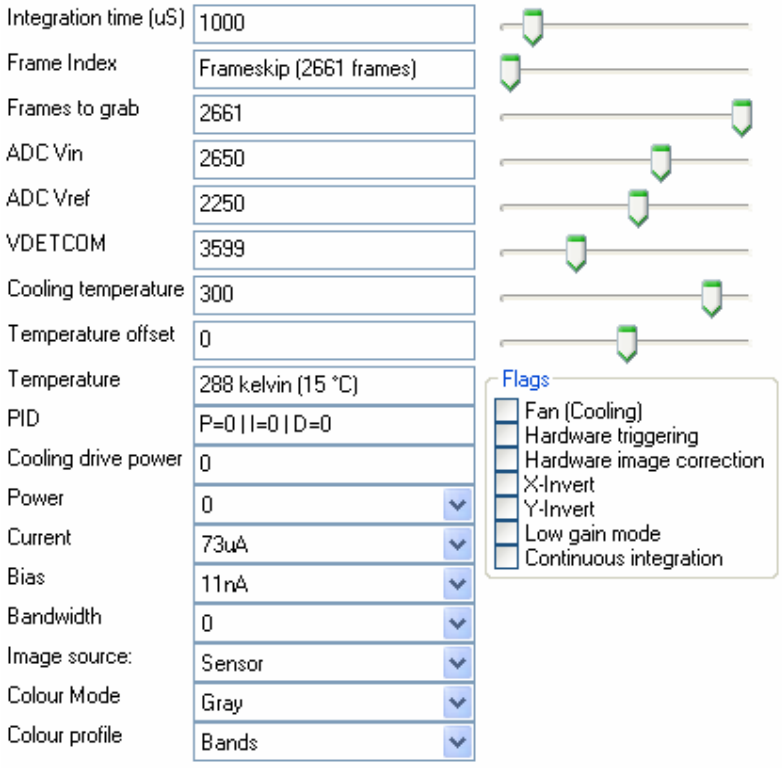


A second dialog interface is shown. The number of saved line profiles has to be entered in this dialog.



All the line profiles are stored in on comma separated file.

11. Controls (X-Control Main Screen)



Example: Controls panel for XEVA LVDS CAMERA under DMA operating conditions.

8.1. Camera Controls

Integration time (us)
Displays the actual integration time in µseconds. (Slider can also be used)

ADC Vin
Settings of the mean output value of the IR detector, central point of Video Analog-to-Digital Converter (ADC). (Slider can also be used)

ADC Vref
Half of the ADC conversion window width, defines the range (half the full range) in which the analog output signal can vary. Normally the extremes of the video signal have to be contained within these limits (ADC V_{in}-ADC V_{ref}) and (ADC V_{in}+ADC V_{ref}). (Slider can also be used)

Vdetcom
Parameter to biases the sensor. Max value: 4095, optimal value between 2000 and 4000 depending on temperature setting.

Cooling temperature
Sets the sensor temperature in Kelvin. (Slider can also be used). The camera and the software are only designed to cool the sensor. Temperatures higher than the ambient temperature are not possible.

Temperature
Reads the actual temperature of the IR sensor in Kelvin.

Temperature offset
The offset temperature is a value that can be subtracted (if negative) from or added to the temperature read. This is just to calibrate the sensor readout value. The default value is 0.

PID
PID settings of the hardware cooling control system. (set at zero for software cooling). This parameters are used to select the type of cooling of the camera.In case of software cooling each of this 3 factors are zero.
In case of hardware cooling, the proportional, integral and derivative factor are set to certain levels.

Cooling drive power
Cooling drive power of the software cooling. In case of software cooling, 0 means that there is no cooling power. 4095 means the maximum cooling power. This value is sent to the cooling of the camera. When the indication displays during long periods the value of 4095, the sensor package will get overheated. It is strongly recommended to increase the setpoint temperature in such a way that the steady state reading is lower than 3700.

Power
Peripheral circuit power, ; best leave in nominal position “power 2”. When selecting another position the overall power consumption will be increased or decreased with 30% per step relatively to the default position.

Current
This value sets the current bias.

Bias
FPA bias. Bias current of the capacitive trans impedance amplifier (CTIA). Example: If the **Current** is set 100 µA, than the **Bias** displays the exact value of the bias of the CTIA. If the **Current** is set to other values, one should understand it as a multiplication coefficient between 0.73-1.47. For example: **Current** is set: 73 µA, and **Bias** is set to 11 nA, than the forced current into the CTIA is equal to: 0.73*11nA=8.03 nA

Ebas
XPORT bias of the detector

Bandwith
Bandwidth of the CTIA stage. Default value is "**Bandwidth 1**". In the high gain, it can be interesting to change to the "**Bandwidth 3**" position to further reduce the CTIA noise. In the low gain case the position **2** and **3** are discarded.

FID, offset
Do not change these values, only for XPORT

Gain
Adjusts the gain of the camera. Standard value is 2.3 for XPORT.

Image source
Image source should read 'sensor', camera diagnose: X-Diagnostic, Y-Diagnostic: X0R-Diagnostic

Colour Mode
Gray: This option is loaded as default after start up of the X-Control software.
Pseudocolour: Hue mapping of the intensity values.
Full colour: Gray scale, but images are stored in 16 bit formats, if supported by the file format (use png or tif format for 16 bit images).
Profile: See colour profile.

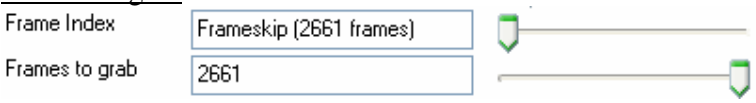
Colour profile
Different colour profiles can be chosen:
Bands, Intensity, Peano0, Peano1, Ramp, Spectrum, Thermal, Thermal2-Inverted, Thermal2

Note: XPORT
First, make sure the automatic FPN calibration (in Filters, XTIR) is switched off. Then adjust the bias (Ebas value) so that the histogram peak is located at about 8000 AD counts (in the center of the histogram). The Ebas value should be around 3455 – 3460. Finally, switch on the FPN calibration.

8.2. Controls for DMA mode

Frame Index
Sets the display mode when running the camera in DMA mode (only for XEVA Camera Linkcamera) in combination with a Vector PCI framegrabber card.

Frames to grab



Set how many frames X-Control should acquire each pass it makes over system memory. This count is limited by how much memory you have available for frame grabbing, and will auto adapt when setting smaller window sizes see also the zoom/set WOI tool.

In order to display images on screen in the DMA mode, two options can be chosen: frame skip and synchronous. Moving from left to right with the slider (click on the

slider and use the right arrow to move to synchronous) next to the frame index counter, you will find in the following order:

- Frame skip display
- Synchronous display (only if the recording option is enabled)
- Still images from all the frames stored in memory, going from frame "0" till the maximal frame number.

The frame index also indicates between brackets the number of frames that can be stored in the DMA memory. This number depends on the size of the memory allocated to the DMA memory and on the window size used to read out the frames.

In ***frame skip*** mode the image data is displayed as fast as possible. X-Control will run through the DMA memory on the PC and will only display the most recent image it finds. This will result in a fast display of the images on screen but may result in loss of images. This mode is useful to fine tune the settings of the camera or the measurement set-up since the image displayed on screen is following real time changes in the set up. It also allows you calibrate the camera should this be needed.

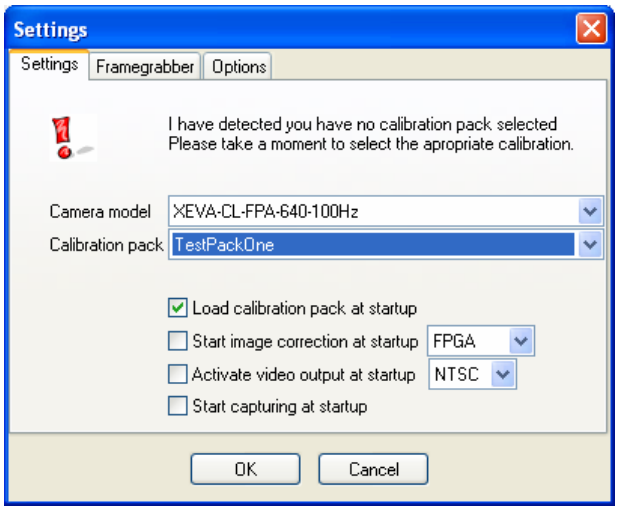
The ***synchronous*** mode is only available when the video recording option is enabled. This mode is used to show all images saved to hard disk. In ***synchronous*** operation X-control tries to display all the images saved in the memory buffer. Since the software cannot always follow the speed of the camera, the image displayed on the screen might lag behind the real time image.

8.3. Flags

Hardware triggering
An external trigger signal can be used for triggered capturing of images. First, stop image capturing (by clicking the pause button in the X-view window), then apply the trigger signal to the camera and switch on the 'hardware triggering ' flag. Start the image capture (play button in X-view).

Fan
Switch on the cooling fan of the camera. The fan should always run when cooling is applied to the sensor. We recommend that you leave the Fan ON, otherwise the camera's components heat up.

FPGA Pixel correction
Uploads the correction data to the FPGA. Note that this flag is only available for cameras with a 9808 read out chip. If the FPGA Pixel correction flag is chosen, the setting dialog will pop up to indicate the correction pack.



From this correction pack, the binary correction file will be generated.

Note that if a reduced window of interest is set by means of the tool menu, only the concerned correction data of the selected window will be uploaded to the FPGA.

X-Invert
Inverts image horizontally. Inversion is done on chip, therefore a new calibration is needed.

Y-Invert
Inverts image vertically.

Reset
Enabling this option the FPA itself is reset.

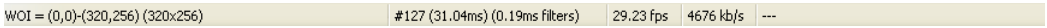
Low gain mode
A large integration capacitor is used in the trans-impedance amplifier circuit. Therefore, overall system noise is reduced but longer integration times are needed. Enabling this option, the array's sensitivity is multiplied by a factor of 20.
In high gain mode the output conversion factor of the FPA is 16microvolt/electron, and in the low gain mode this factor is 0.8microvolt/electron.

Continuous integration
Enabling this option has a consequence that the feedback capacitor in the readout is not reset. This mode is useful once the user wants to use very long integration times. However, using standard integration times this option should be left unchecked. By default this option is not activated.

Freeze frame
Freeze imaging window.

Shutter open
Shutter can be opened by checking this box (only for XPORT available).

8.4. Status bar



First entry

Depends of the used tools in the displayed image (see XTools).

Second entry
Frame counter
Milliseconds per frame
Milliseconds per queued filer

Third entry
Frames per second

Fourth entry
Kilo bits per second

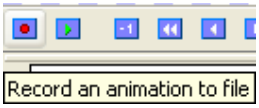
Fifth entry
Actual queued image filter. If no software filter is applied, no filter is displayed in the status bar.
If more than one filer is applied, the consecutive filters are shown in the status bar.

[00] Software image correction (none)
[01] Histogram stretching (none)
…

12. Video

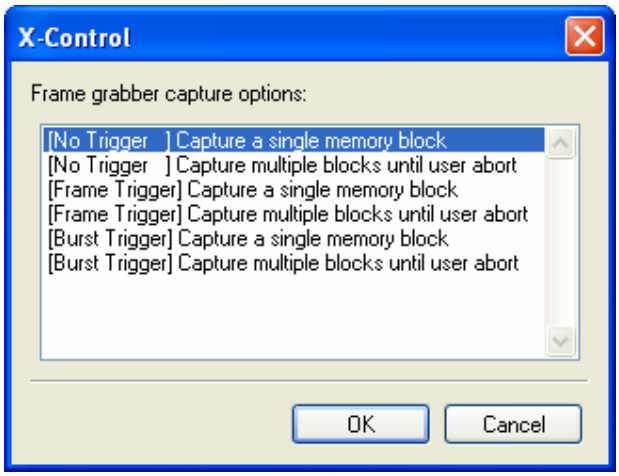
This toolbar in the X-View imaging window allows the user to capture live video either to file on the PC's Hard Disk.

Start to record:
Push the first record button in the toolbar



Record in DMA mode:

When clicking on the record button the following screen will appear only in case if a XEVA-CL-CAMERA or XEVA-LVDS-CAMERA is used.


X-Control
Frame grabber capture options:
[No Trigger] Capture a single memory block
[No Trigger] Capture multiple blocks until user abort
[Frame Trigger] Capture a single memory block
[Frame Trigger] Capture multiple blocks until user abort
[Burst Trigger] Capture a single memory block
[Burst Trigger] Capture multiple blocks until user abort
OK
Cancel

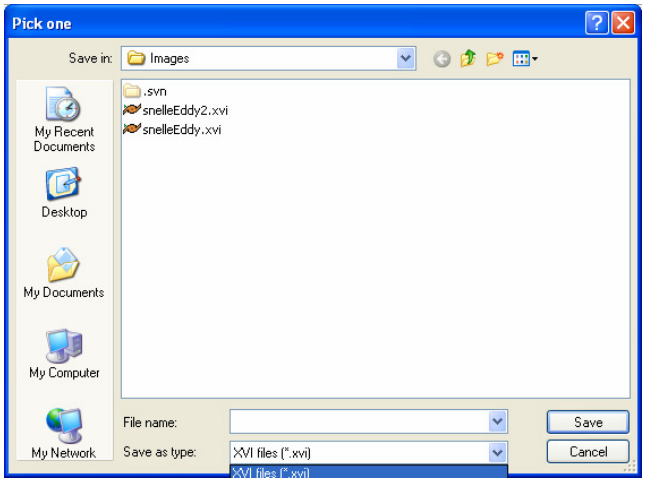
In **single memory block** mode, a given number of image frames (depending on the size of the DMA memory) will be written to disk. Afterwards, the recording stops.

For **multiple blocks**, the image frames will be written to memory cyclically. In parallel, but at lower speed, the image frames are written to hard disk. A small discontinuity in frame grabbing after every cycle is possible.

Frame trigger means that the camera will wait for a trigger pulse for each frame.

Burst trigger means that the camera will wait for a trigger pulse to start transferring a complete memory block to disk.

File name:
Before recording starts, the user has to name the file and save it as a XVI- (XenICs format) or AVI-file format.

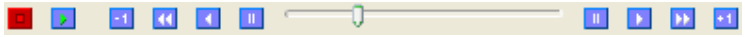


If a file format and name has been chosen and saved, the record mode starts.

Record mode:
Images can be recorded uncorrected or corrected. This does not influence the frame rate since the correction will be done by the software after the images have been transferred to memory.

When the software records to file, the record button of the toolbar is shown in a red color.

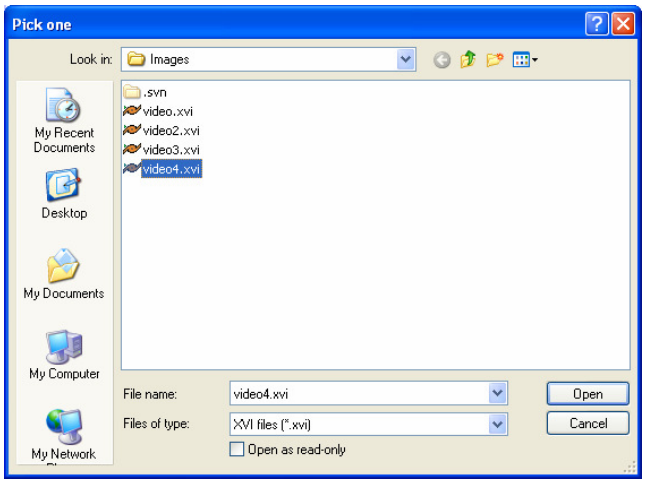
Stop the record mode to file:
Push the red record button of the toolbar.



The toolbar will change into:

Video playback:
Push the second button of the toolbar ( ).

An open file dialog appears. Select en open the video you want to play back.



The toolbar in the X-View imaging window will be displayed in following way:

Now you can start to analyze selected XVI or AVI-file by means of following buttons:

- move one image back
- move one image or forward
- play back forward
- play back reverse sens
- play back forward in high speed (wind forward)
- play back reverse sens high speed (wind backward)
- stop the play back

You can use as well the slider to move into your recorded file. The slider is a progress indicator of the relative position in the selected XVI or AVI-file.

After analyzing a video you restart image capture by means of pushing the red playback icon in the toolbar of the X-View imaging window ( ).

How to make a simple recording

1. Start capture.
2. Push record button.
3. Give in filename and save.
4. X-Control starts recording.
5. To stop recording push the record button again.

How to playback a recorded file

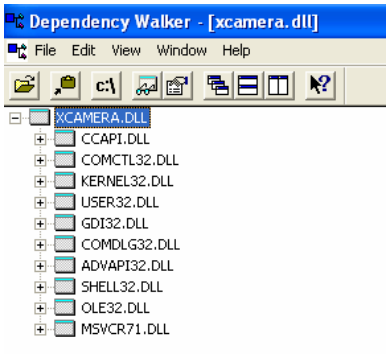
1. Stop capturing.
2. Push playback button and choose XVI-file. Click Open.
3. To stop playback, push playback button again.

13. SDK Development kit

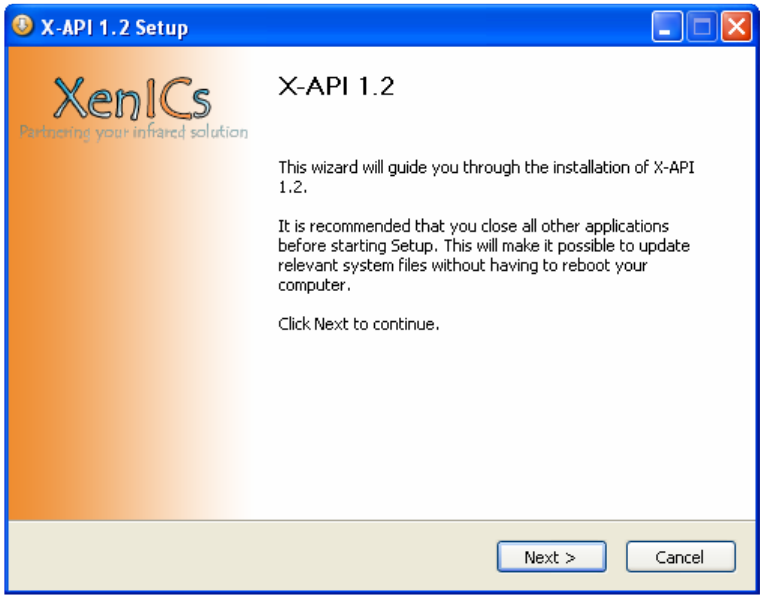
In addition to XControl, a development kit can be installed to design your application. Interfaces are available for Labview, C-languages and Visual basic.

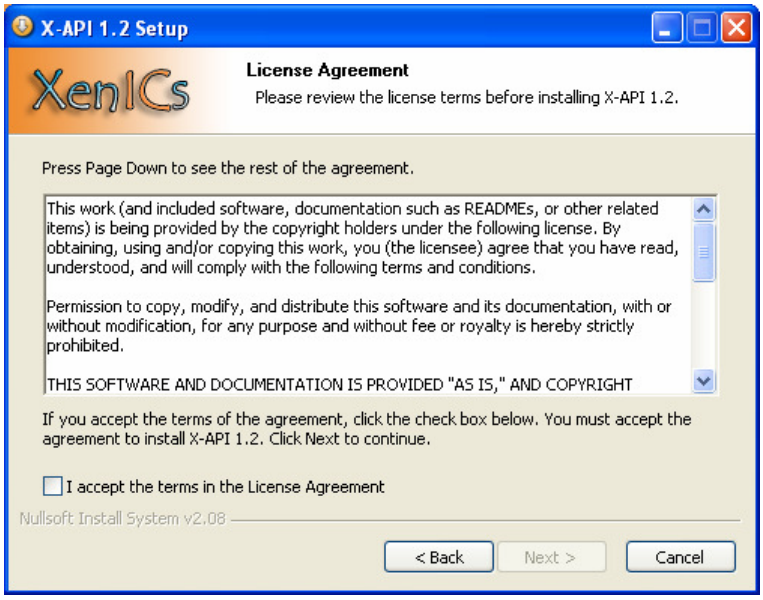
XCamera.dll
XCamera hands over a new user friendly api for developers to integrate functions of a camera in your developed applications.

XCamera depends of CCAPI. XCamera makes calls of CCAPI functions.
This can be illustrated by a view by means of the dependency viewer of Microsoft.

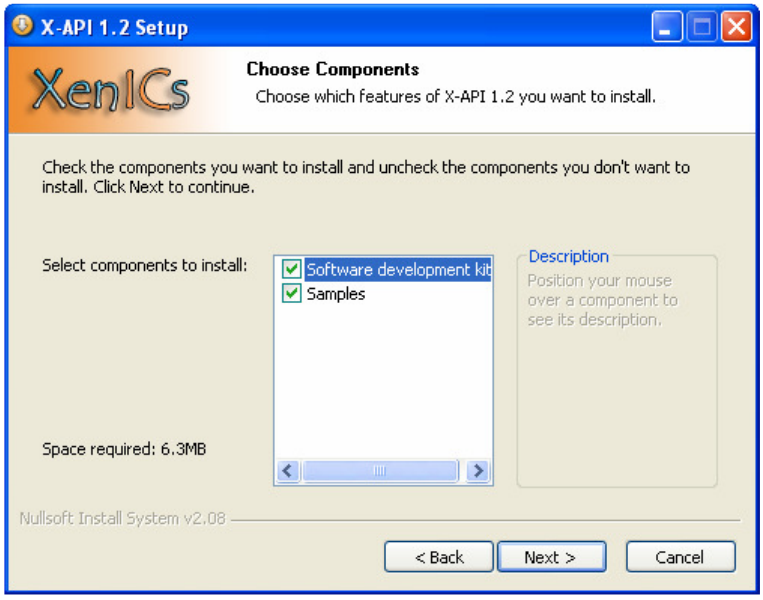


Installation
An installer will guide you through the installation.
It is recommended to install the API after the installation of X-Control with the camera pack.

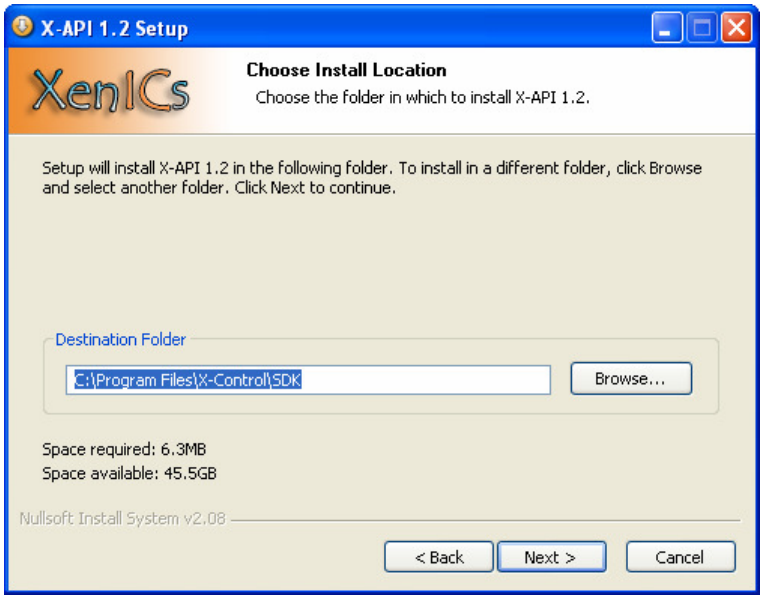

X-API 1.2 Setup
XenICs
Partnering your infrared solution
X-API 1.2
This wizard will guide you through the installation of X-API 1.2.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel


X-API 1.2 Setup
XenICs
License Agreement
Please review the license terms before installing X-API 1.2.
Press Page Down to see the rest of the agreement.
This work (and included software, documentation such as READMEs, or other related items) is being provided by the copyright holders under the following license. By obtaining, using and/or copying this work, you (the licensee) agree that you have read, understood, and will comply with the following terms and conditions.
Permission to copy, modify, and distribute this software and its documentation, with or without modification, for any purpose and without fee or royalty is hereby strictly prohibited.
THIS SOFTWARE AND DOCUMENTATION IS PROVIDED "AS IS," AND COPYRIGHT
If you accept the terms of the agreement, click the check box below. You must accept the agreement to install X-API 1.2. Click Next to continue.
I accept the terms in the License Agreement
Nullsoft Install System v2.08
< Back
Next >
Cancel

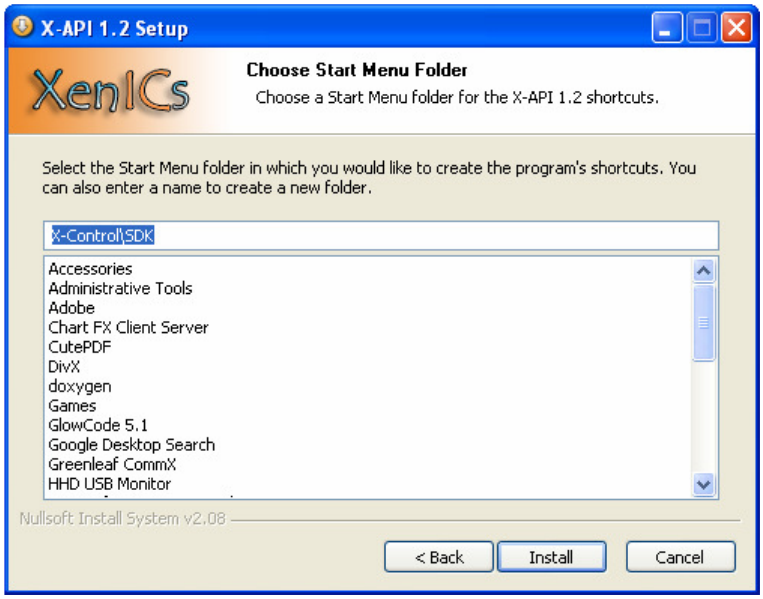
Select “I accept the terms in the License Agreement.

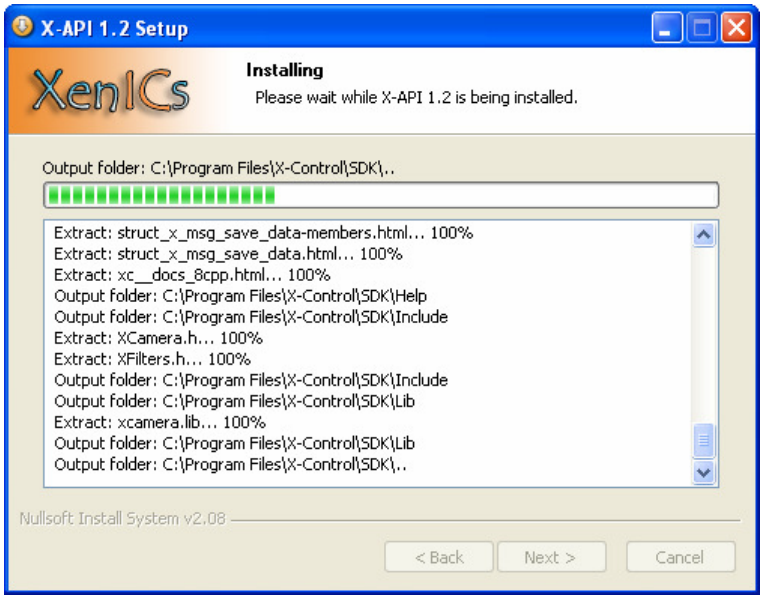

X-API 1.2 Setup
XenICs
Choose Components
Choose which features of X-API 1.2 you want to install.
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select components to install:
Software development kit
Samples
Description
Position your mouse over a component to see its description.
Space required: 6.3MB
Nullsoft Install System v2.08
< Back
Next >
Cancel

Code samples and software development kit will be installed.


X-API 1.2 Setup
XenICs
Choose Install Location
Choose the folder in which to install X-API 1.2.
Setup will install X-API 1.2 in the following folder. To install in a different folder, click Browse and select another folder. Click Next to continue.
Destination Folder
C:\Program Files\X-Control\SDK
Browse...
Space required: 6.3MB
Space available: 45.5GB
Nullsoft Install System v2.08
< Back
Next >
Cancel

Choose the same installation folder as the installation folder of X-Control.





A progress install dialog is shown.

Prerequisite to use XCamera.dll

If you do not have an X-Control installation on the pc where your software will be deployed, you should copy the following files to the directory where your executeable is located:

C:\Program Files\X-Control\TTB
This folder contains the logic files required to boot up the camera, X-control will choose the appropriate one automatically.

C:\Program Files\X-Control\Data
This folder contains any calibration data you may wish to distribute...

So your final application directory should look something like this:
C:\SomeApp\SomeApp.Exe
C:\SomeApp\TTB*.ttb
C:\SomeApp\Data*.*

Following data can be found in the respective install directories.

Documentation of the SDK
.\X-Control\SDK\Help

Headers
.\X-Control\SDK\Include

XCamera library
.\X-Control\SDK\Lib

Samples
.\X-Control\SDK\Samples
Different kinds of samples are available:

- LabView
- MFC
- MFCVC6
- VB6

Additional information of the XVI file format is available used in XControl is available (.\X-Control\SDK\Samples\XVI Format)